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EPA 904/9-79-044D
October 1979

EPA Environmental Impact Statement

DRAFT

Estech General Chemicals Corporation
Duette Mine
Manatee County, Florida

NOISE

RESOURCE DOCUMENT

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The Draft Environmental Impact Statement for the Estech General Chemicals (formerly Swift Agricultural Chemical) Duette Mine is enclosed for your review and comment. The document has been prepared pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) (Public Law 91-190) and applicable EPA regulations at 40 CFR Part 6.9. Thirteen volumes of resource documents were also prepared. These resource documents comprise the detailed technical evaluations of the alternatives and the proposed action and contain supporting data related to the Draft EIS. While the Draft EIS is a complete document.

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Draft Environmental Impact Statement

Swift Agricultural Chemicals Corporation
Duette Mine Site
Manatee County, Florida

October, 1979

Prepared for:

U. S. ENVIRONMENTAL PROTECTION AGENCY
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Prepared by:

CONSERVATION CONSULTANTS, INC.
Post Office Box 35
Palmetto, Florida 33561

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NOTE:

Effective August 1, 1979, Swift Agricultural Chemicals Corporation changed its name to Estech General Chemicals Corporation.

The preparation of the Draft Environmental Impact Statement was substantially completed at the time of the name change. Therefore, the name of Swift Agricultural Chemicals Corporation (Swift) is used throughout the Draft Environmental Impact Statement and all attendant Resource Documents.

PART I - NOISE BASELINE

1. INTRODUCTION

A baseline noise monitoring study was conducted on November 1, 2, and 15, 1978, to determine existing sound levels in areas susceptible to noise impact due to the proposed Swift Duette Mining Operation. The location of the proposed Duette Mine is shown in Figure 1-1. The proposed mine site and surrounding areas are generally undeveloped lands with few existing noise receptors. Measurements were performed at seven receptor sites adjacent to, or enclosed within, the proposed mine site. Measured levels were then compared with applicable federal standards and guidelines.

2. SITE SELECTION

The objective of the site selection procedure was to identify existing receptors and potential locations for external private development near major generators of noise associated with the mining operation. Existing receptor sites were identified by aerial photographs and site surveys. Study sites were selected in areas adjacent to, and enclosed within, the proposed project and included a church, school, and several private residences. A single outparcel of privately owned land is enclosed within the northern sector of the proposed project. The residence located within the outparcel was selected as an additional receptor site.

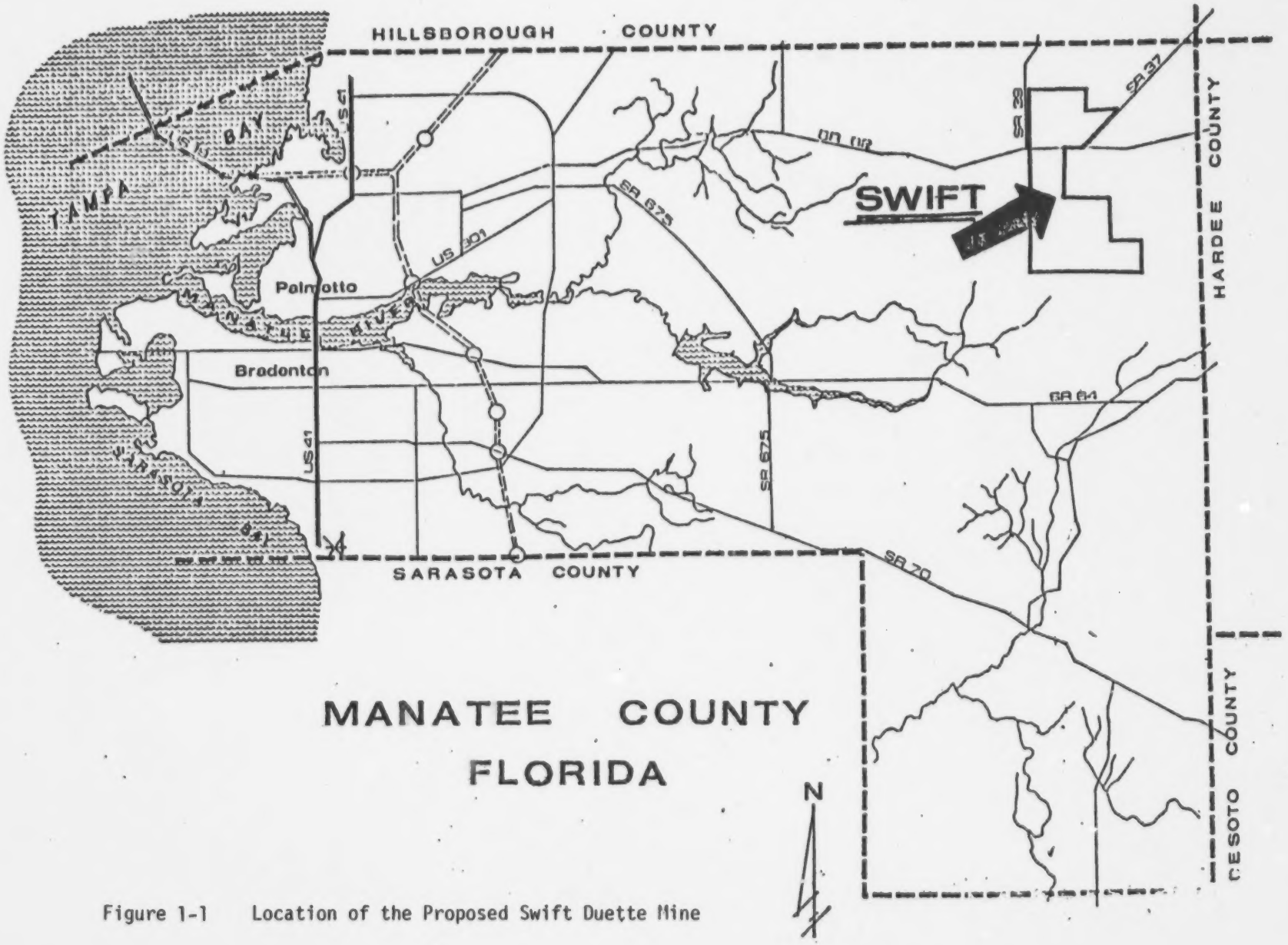

Figure 1-1 Location of the Proposed Swift Duette Mine

Current Manatee County zoning maps were reviewed in order to determine locations for potential external private development. The review indicated that all areas adjacent to the project are zoned agricultural with certain special use exceptions. Exceptions included existing residences and the church and school identified above. Due to the agricultural zoning of peripheral lands, areas of specific potential future development could not be identified.

3. SITE DESCRIPTIONS

Noise monitoring site locations are displayed in Figure 3-1. Brief descriptions of each of the sites as well as exact locations relative to fixed landmarks are as follows:

Site No.	Description
1	This site is located in Duette between the Duette School and neighboring Dry Prairie Baptist Church, near the intersection of State Road 62 and Taylor Road. The exact site location is 327 feet south of State Road 62, 44 feet west of the church, 67 feet south of the church, 45 feet north of the school and 183 feet east of the school.
2	This site is located in Keentown, approximately 2 miles north northwest of the proposed plant site. Specifically, the site is 247 feet south of the 90° bend in Keentown Road, where the road enters Keentown, 93 feet north of the most northerly residence in Keentown and 8 feet west of Keentown

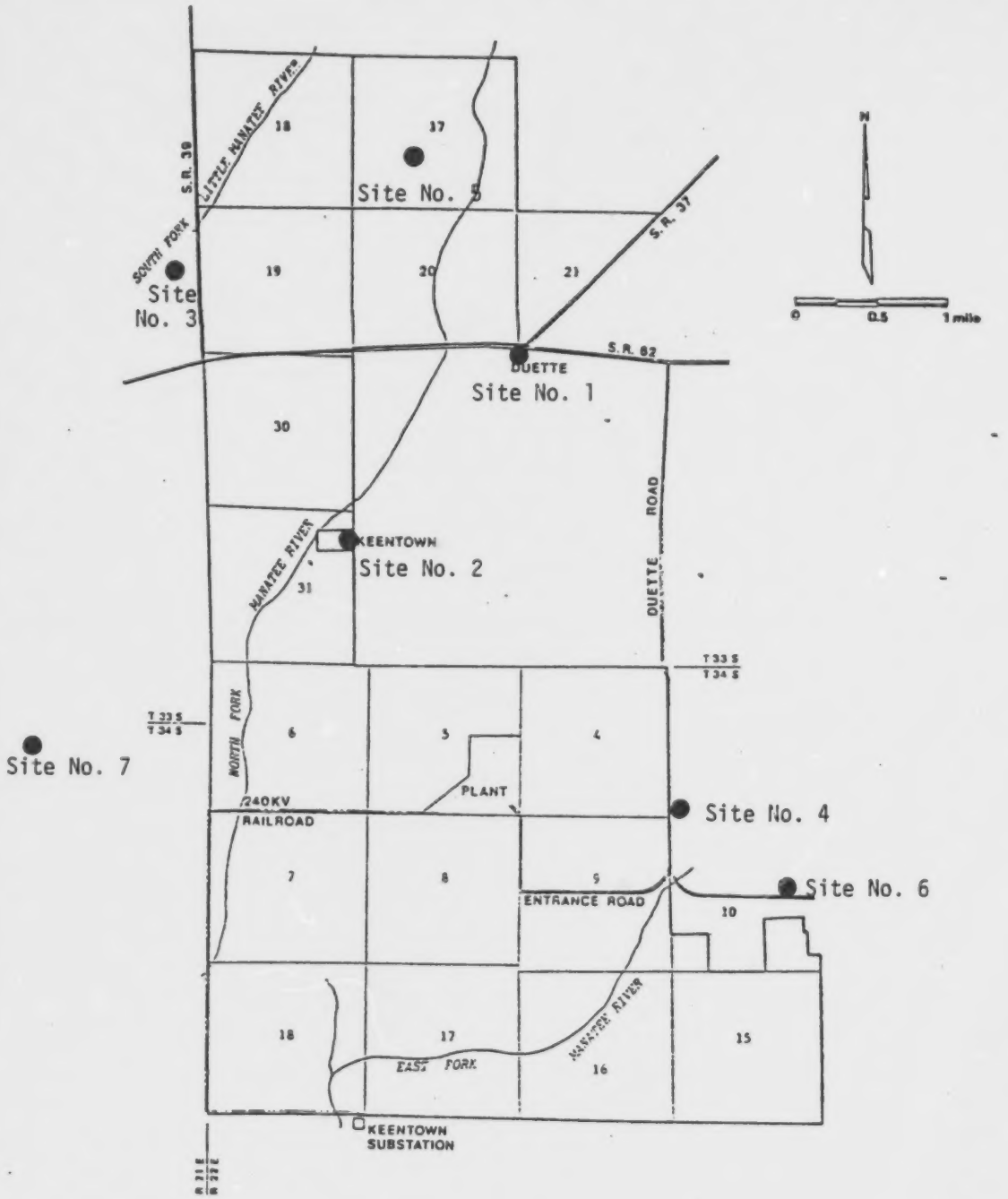

Figure 3-1 Noise Baseline Monitoring Site Locations

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Site No.	Description
	Road (Keentown Road is a cul-de-sac serving only the few residences in Keentown and has minimal traffic use. During the three half hour periods of monitoring, only one car passed the site).
3	This site is at the first residence on the west side of State Road 39, north of State Road 62, approximately three-tenths mile west of State Road 39. The exact location is 48 feet east of the residence, and 38 feet north of the residence.
4	This site is located near two residences at the east end of Chancey Cemetery Road, approximately one and three-tenths mile east of the proposed plant site. The specific location of the monitoring site is 583 feet east of Duette Road, 55 feet south of the most southerly corner of the mobile home residence and 60 feet west of the most southerly corner of the mobile home.
5	This site is on a private farm in an outparcel of land totally enclosed within the northern sector of the proposed project. The exact location of the site is 73 feet east of the residence, 140 feet north of the residence and 620 feet south of the Swift property line along the northern edge of the out-parcel.

Site No.	Description
6	This site is on the north side of the east-west section of Duette Road, one quarter mile west of the dirt road which extends southward from Duette Road to the southeast corner of the Swift property. The exact location is 50 feet north of Duette Road and 68 feet east of the only concrete culvert under this section of Duette Road.
7	This site is the first receptor site west of the project, adjacent to the proposed railway route to the plant site. The site is located on Bill Parrish Road, 2.3 miles south of State Road 62. The exact location is 200 feet north of a tributary of the North Fork of the Manatee River which extends under Bill Parrish Road, 10 feet west of the road and approximately 500 feet north of a residence on the west side of Bill Parrish Road. The site was chosen to be representative of the residence to which access was not possible.

4. MEASUREMENT METHOD

All measurements were performed with a General Radio Model 1945 Community Noise Analyzer, utilizing an A-weighted network. Calibrations were performed with a B & K Model 4230 Sound Level Calibrator. Monitoring was conducted at windspeeds below 10 knots and in addition a windscreen was used during all measurements. Relative humidity was determined with a sling psychrometer at each site and all measurements were conducted with relative humidity at less than ninety percent.

The GR 1945 provides direct readout of equivalent noise levels (L_{eq}) and exceedance levels (L_x) for comparison with Federal Highway Administration (FHWA) standards. The instrument also provides estimates of exceedance levels of 8 hours in 24 ($L_{33.3}$), 1 hour in 24 ($L_{4.16}$) and .5 hour in 24 ($L_{2.08}$) for comparison with Department of Housing and Urban Development (HUD) standards. Where significant, estimates of day-night sound level (L_{dn}) were computed for comparison with Environmental Protection Agency (EPA) guidelines and National Research Council (NRC) estimates.

Reported values of $L_{33.3}$, $L_{4.16}$, and $L_{2.08}$ are estimates for comparison with HUD standards rather than actual 24-hour measurements. In order to conduct more than one measurement per day, several short intermittent measurements were performed rather than single continuous 24-hour measurements. A minimum of two one-half hour measurements were performed at each site and assumed to be representative of the entire 24-hour period.

Actual L_{dn} measurements would also have required continuous 24-hour monitoring. Alternately, L_{dn} estimates were computed based upon one-half hour measurements by applying a 10 dBA weighting for the nighttime interval to the average measured L_{eq}. Average L_{eq} was determined from at least two half hour periods at different times of day for each site. In any case where appreciable changes in levels were noted, more than two measurements were performed.

5. APPLICABLE STANDARDS AND GUIDELINES

Several federal agencies have established standards, guidelines and screening criteria in an attempt to control the levels of noise to

which people are subjected. Among these federal agencies are the Environmental Protection Agency, the Department of Housing and Urban Development, and the Federal Highway Administration.

The Environmental Protection Agency, in Report 550/9-74-004, established an L_{dn} of 55 dBA as a maximum requisite to protect public health and welfare with an adequate margin of safety.

The Department of Housing and Urban Development, in Circular 1390.2, promulgated minimum standards with respect to noise abatement and control, in order to protect citizens against the encroachment of noise into their communities and places of residence. HUD external noise exposure standards for new construction sites are displayed in Table 5-A. The standards are divided into three general groupings of noise exposure: acceptable, discretionary, and unacceptable. Discretionary exposures may be subdivided into the categories of normally acceptable and normally unacceptable. HUD standards are described in terms of noise exceedance levels.

The Federal Highway Administration has specified in FHPM 7-7-3 standard design noise levels for five activity categories (A through E). The residences, school, and church selected as sites in this study are all included in activity category B. The design noise levels for activity category B are 67 dBA for L_{eq} and L_{dn}, respectively.

6. NOISE MEASUREMENTS/ESTIMATES

Pertinent measured and estimated noise levels are displayed in Table 6-A, for comparison with applicable federal guidelines and standards.

Table 5-A HUD General External Noise Exposure Standards for New Construction Sites (dBA)

	$L_{33.3}$	$L_{4.16}$	$L_{2.08}$
UNACCEPTABLE:			
Exceeds 80 dBA 60 minutes per 24 hours		> 80	
Exceeds 75 dBA 8 hours per 24 hours	> 75		
DISCRETIONARY-NORMALLY UNACCEPTABLE:			
Exceeds 65 dBA 8 hours per 24 hours	> 65		
DISCRETIONARY-NORMALLY ACCEPTABLE:			
Does not exceed 65 dBA more than 8 hours per 24 hours	$\leq$65		
ACCEPTABLE:			
Does not exceed 45 dBA more than 30 minutes per 24 hours			$\leq$ 45

Table 6-A Measured and Estimated Baseline Noise Levels at the Proposed Duette Mine Site

Site No.	Location		L_{10}	L_{eq}	L_{dn}	$L_{33.3}$	$L_{4.16}$	$L_{2.08}$
1	Duette		54	50	---	46	58	60
			50	48	---	44	55	58
		Avg.	52.0	49.0	---	45.0	56.5	59.0
2	Keentown		42	49	---	37	46	48
			46	43	---	42	48	50
			46	42	---	41	48	49
		Avg.	44.7	44.7	51	40.0	47.3	49.0
3	S.R. 39		45	42	---	41	48	49
			47	44	---	40	50	52
		Avg.	46.0	43.0	49	40.5	49.0	50.5
4	Chancey Cemetery Road		36	34	---	33	39	41
			44	42	---	41	46	47
			43	43	---	39	46	50
		Avg.	41.0	39.7	46	37.7	43.7	46.0
5	Outparcel		49	46	---	44	52	54
			46	43	---	41	49	51
			36	36	---	32	39	42
		Avg.	43.7	41.7	48	39.0	46.7	49.0

Table 6-A (Continued)

Site No.	Location		L_{10}	L_{eq}	L_{dn}	$L_{33.3}$	$L_{4.16}$	$L_{2.08}$
6	Duette Road		45	47	---	40	49	54
			44	46	---	40	48	53
		Avg.	44.5	46.5	52	40.0	48.5	53.5
7	Bill Parrish Road		39	39	---	37	43	47
			38	37	---	35	40	42
		Avg.	38.5	38.0	44	36.0	41.5	44.5

An alternative method for estimating L_{dn} is provided in Guidelines for Preparing Environmental Impact Statements on Noise (NAS, 1977). This method, developed by the National Research Council (NRC), estimates L_{dn} on the basis of population density. The estimated L_{dn} values for various population densities are provided in Table 6-B.

It should be noted that L_{dn} estimates based on field measurements uniformly exceed the 35 dBA NRC estimate for population density less than 20 people per square mile. In a majority of cases, the measured L_{eq} also exceeds the NRC estimate.

7. DISCUSSION OF RESULTS

7.1 Site Number 1

Measurements at the Duette Site exhibited the highest levels of any of the seven sites. Traffic on nearby State Road 62 was a dominant factor with an average flow during the two measurement periods of 98 vehicles per hour.

The L_{dn} estimate for comparison with the EPA guideline was not computed for the Duette Site. An L_{dn} estimate based upon a daytime L_{eq} measurement at this site would be artifically elevated due to increased daytime traffic flow. Since this site represents a school and church which are normally only daytime receptors (i.e., no activities between 10 p.m. and 7 a.m.), the L_{dn} is less significant than the L_{dn} of a residential receptor site.

All measured levels at this site fell within the "normally acceptable" range specified in the HUD standards. The measured L_{eq} and L_{10} were well within the FHWA Category B standard for schools and churches.

Table 6-B Typical Values of Yearly Day-Night Average Sound Level for Various Residential Neighborhoods Where There is no Well Defined Sources of Noise Other Than Usual Transportation Noise

Description	Population Density (People/Sq. Mi.)	L_{dn} - dBA
Rural (undeveloped)	20	35
Rural (partially developed)	60	40
Quiet Suburban	200	45
Normal Suburban	600	50
Urban	2000	55
Noisy Urban	6000	60
Very Noisy Urban	20000	65

7.2 Site Number 2

Three measurements were conducted at the Keentown site. The third measurement was taken after the first measurement was thought to have been biased by a single loud vehicle which passed near the site during monitoring.

The average L_{dn} for this site was 51 dBA, which is 4 dBA below the EPA requisite to protect public health. Measured exceedance levels fell within the "normally acceptable" range of HUD specified noise levels. All measured L_{eq} and L_{10} values were well within the FHWA Category B standard for residences.

7.3 Site Number 3

The L_{dn} for site number 3 averaged 49 dBA, which is 6 dBA below the EPA guideline. Measured exceedance levels were within the "normally acceptable" HUD range and L_{eq} and L_{10} were well within the FHWA Category B standard for residences. Traffic on State Road 39 contributed somewhat to noise levels measured at this site. The average traffic flow during the two measurement periods was 64 vehicles per hour.

7.4 Site Number 4

The average L_{dn} for the Chancey Cemetery Road site was 46 dBA, which is 9 dBA below the EPA guideline. Of the three measurements conducted, one was in the "acceptable" HUD range and two were in the "normally acceptable" range. All measured L_{eq} and L_{10} values were well within the FHWA standard for residences.

7.5 Site Number 5

Three measurements were also conducted at site number 5. The estimated L_{dn} averaged 48 dBA, which is 7 dBA below the EPA requisite to protect public health. Two of the three measurements were within the "normally acceptable" range specified by HUD and the third was in the "acceptable" range. The measured L_{eq} and L_{10} values were well within the FHWA Category B standard for residences.

7.6 Site Number 6

The average L_{dn} for site number 6 was 52 dBA, which is 3 dBA below the EPA guideline, and all measurements were within the "normally acceptable" HUD range. The measured L_{eq} and L_{10} values were well within the FHWA standard for residences.

7.7 Site Number 7

The L_{dn} at the Bill Parrish Road site averaged 44 dBA, which is 11 dBA below the EPA requisite to protect public health. One of the two measurements performed at this site was in the "normally acceptable" HUD range and the second measurement was in the "acceptable" range. All measured L_{eq} and L_{10} values were well within the FHWA Category B standard for residences.

8. SUMMARY

A comparison of all measured and estimated noise levels with applicable standards and guidelines may be summarized as follows.

All L_{dn} values estimated from field L_{eq} measurements were at least 3 dBA within the EPA guideline and the average L_{dn} was 7 dBA within the guide-

line. Measured noise levels for comparison with HUD standards were all within the "acceptable" or "normally acceptable" categories. Measured L_{eq} values were all at least 17 dBA within the FHWA Category B standard and the average measured L_{eq} was 24 dBA within the standard. The highest estimated L_{dn} was 18 dBA within the FHWA standard and the average L_{dn} for all sites was 22 dBA within the standard.

PART II

NOISE IMPACT

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PART II - NOISE IMPACT

1. INTRODUCTION

The objective of the noise impact assessment for the proposed Duette Mine was to determine if and to what extent projected noise levels at sensitive receptors in the vicinity of the mine exceeded established noise criteria requisite to protect public health and welfare. The analysis considered mine related noise generation as well as the projected increase in noise levels owing to vehicular traffic not associated with the mine.

The assessment consisted of three phases. The sound pressure levels generated by sources unique to phosphate mining activities and proposed for the new facility were first estimated through measurements of similar sources. Equations relating sound pressure levels to distance were derived for each source (or group of sources) from the field measurements through the use of a simplified model assuming free field conditions (i.e., unobstructed sound transmission). Similarly, equations of sound level as a function of distance were derived for the projected railroad traffic and for other mine related sources on which published noise level data or applicable emission standards were already available.

In the second phase of the assessment, the cumulative noise level produced by significant contributing sources was computed at an array of points in the vicinity of the property boundary from which the day-night average sound level (L_{dn}) contour of 55 decibels (dBA) was constructed. More realistic predictions of noise levels at specific sensitive

receptors in the vicinity of the mine were made by taking into account noise attenuation due to ground absorption.

The impact of projected noise levels was analyzed in the final phase through a comparison with EPA's criteria for interior and exterior sound levels requisite to protect the public health and welfare (EPA, 1974). Receptors at which the noise levels exceeded the EPA criteria were further evaluated through a determination of maximum hourly equivalent sound level (L_{eq}) and subsequent comparison with Federal Highway Administration (FHWA, 1976) and U. S. Department of Housing and Urban Development (HUD, 1971) guidelines.

The presence of pure tones emitted from mine related noise sources and particularly intrusive noise (owing either to spectral content or intermittency) were also evaluated.

2. SOURCE CONTRIBUTIONS

The overall noise level in the vicinity of the proposed mine at the time it becomes operational in 1982, will be contributed to substantially by both mine and non-mine related sources. To quantify the contributions from the various noise sources accepted noise analysis techniques were used when reliable input data were available. Where existing data were insufficient to predict the probable noise contribution from a given source, e.g., the electric dragline, field measurements were made of similar existing sources. In this section of the report, the noise monitoring programs and/or methodologies used to determine source power levels and their variation with distance from the source are described.

2.1 Mine Related Sources

Noise sources associated with the proposed mine may be considered directly or indirectly related to the mine. Indirectly related sources include the rail and highway traffic generated to support the mining activity and are treated separately later in this section.

Significant noise sources associated directly with the mining activities include the following facilities and equipment: (1) the dragline and sluice pit; (2) washer and flotation facility; (3) dryer and bulk loading facility (and switch yard); (4) earth moving equipment used in land reclamation and land clearing. It is convenient as well as realistic to consider the first three groups of facilities as single noise sources because of the close proximity of equipment within each group compared to the relatively large distances from sensitive noise receptors. Moreover, the first three groups of facilities are uniquely associated with phosphate mining activities, and lacked published noise data on their sound power levels. To correct this deficiency a field measurement program was undertaken to determine sound power levels of the same groups of facilities at a phosphate mine and beneficiation facility similar to the proposed mine. During that same monitoring program, which is described below, noise levels of land clearing and reclamation activities were also monitored and verified through comparison with available noise emission data for earth moving equipment.

Source Measurement Program - Noise levels emitted by the specified groups of facilities were measured at Swift Agricultural Chemicals Corporation's Silver City Mine in October, 1978. Generally, several

measurements were made at each source group at sufficient distances from the facilities to avoid near-field effects and at locations chosen to detect directivity of the sources. Measurements were made with General Radio Model 1945 Community Noise Analyzer utilizing and A-weighted network.

The GR 1945 provides direct readout of equivalent noise levels (L_{eq}) and exceedance levels (L_{10}, L_{50}, L_{90}, etc.). Because of the relative constancy of the sound pressure levels exhibited by the measured sources, the L_{eq} values were suitable for computing day-night average sound levels (L_{dn}) and, thereby, eliminated the need for continuous 24-hour measurement. As part of the same monitoring program octave band measurements were also conducted to detect the presence of pure tones. These measurements were made with a Bruel and Kjaer Precision Sound Level Meter, Model 2204-S fitted with an Octave Band filter unit Model 1613. While the instrument was not designed to pinpoint the exact frequency of the pure tone, the octave within which the pure tone occurred could be determined.

The detailed methodology and results of the monitoring program are presented in Appendix A.

Sound Level/Distance Relationships - Measured noise levels of each mine related source were manipulated to provide a means of conservatively estimating the noise levels at any distance from the source. All of the sources or groups were idealized as nondirective point sources with the sound waves diverging hemispherically in a homogeneous loss-free atmosphere and over loss-free ground free of barriers. The assumption

of a nondirective source in this case is conservative inasmuch as the maximum noise levels emitted form each source (at a selected reference distance, r_2, or 200 ft.) was used in the derivation of sound level/distance relationships.

Under the assumed conditions, the sound pressure level at a distance r_2 from the source can be calculated by (Beranek, 1971)

$$SPL_2 = SPL_1 - 20 \log_{10}\left(\frac{r_2}{r_1}\right)$$

where

SPL_1, SPL_2 = Sound pressure levels at distances r_1 and r_2 from the source, dB.

Because the sound levels emitted by the mine related facilities are essentially constant during hours of operation (a measured range of 2 dBA was typical), they provide good estimates of the average L_{eq} value over the period of operation.

2.2 Roadway Contribution

Vehicular traffic noise makes a significant contribution to noise levels around most of the property boundaries and at several sensitive receptors near to the proposed development. The noise level at a given distance from a roadway depends primarily upon the volume and speed of traffic flow; however, a variety of factors may attenuate the free field noise level. Since trucks tend to be noisier than automobiles, the overall noise level is also dependent on the mix of automobile and truck traffic.

The methodology followed in predicting the roadway noise contribution combines techniques presented in the National Cooperative Highway

Research Program Report No. 117 (Federal Highway Administration, 1973) and in Transportation Noise: Impacts and Analysis Techniques (Nelson and Wolsko, Argonne National Laboratory, 1973). The general equations used in the approach are discussed below. Both the FHWA and the Argonne methods predict the fifty percent exceedance level (L_{50}) at a specific distance from the roadway. The Argonne equations for automobile and truck base noise levels were selected because they better account for the low traffic volumes carried by some of the roads under consideration.

$$L_{50AUTO} = 10 \log(VAUTO) - 15 \log(DOTCEL) + 20 \log(SAUTO) + 10 \log\{TANH[1.19 \times 10^{-3}\left(\frac{VAUTO \cdot DOTCEL}{SAUTO}\right)]\} + 29 \text{ dBA}$$

where

SAUTO = Average speed of automobiles in mph
VAUTO = Volume of automobile flow in vehicles/hr.
DOTCEL = Equivalent distance from the highway, ft.

$$L_{50TCK} = 10 \log(VTRUCK) - 10 \log(STRUCK) - 15 \log(DOTCEL) + 10 \log\{TANH[1.19 \times 10^{-3}\left(\frac{VTRUCK \cdot DOTCEL}{STRUCK}\right)]\} + 95 \text{ dBA}$$

where

STRUCK = Average speed of trucks in mph
VTRUCK = Volume of trucks in vehicles per hours.

Traffic volume data supplied in the DRI-ADA (Swift Agricultural Chemicals Corporation, 1978) for each roadway was adjusted to the base year 1982 by interpolation of the data. Assuming vehicle speeds of 55 mph, L_{50AUTO} and L_{50TCK} were computed at a distance of 100 feet from the

roadway centerline. The cumulative value of L_{50} for the automobiles and trucks was then determined by logarithmic addition.

The predicted L_{50} values from the roadway traffic were subsequently converted to L_{eq} values in order to have a consistent noise descriptor for the various sources from which L_{dn} values could then be computed. It was determined through a frequency analysis of noise levels measured at Site 1 (Part I - Noise Baseline) that the addition of 5.3 dBA to the cumulative L_{50} value would provide a good estimate of the L_{eq} value. (See Appendix B-2 for derivation of the 5.3 adjustment factor.)

The adjustment to hourly L_{eq} values to account for distance between the receptor and the roadway was based on the figure provided in Appendix B-3 (FHWA, 1973). This distance adjustment did not account for any sound attenuation due to barriers, ground absorption, etc.

The current traffic pattern in the vicinity of the proposed mine exhibits peak flows from 10:00 - 11:00 a.m. and 4:00 - 5:00 p.m. With the mine in operation, three more peak flow hours corresponding to shift changes at the mine would be added to this pattern. To account for the variation in traffic volume, hourly L_{eq} values were computed for each peak hour's traffic volume as well as for the average volume during non-peak hours. The hourly L_{eq} values were finally used to compute the day-night average sound levels, L_{dn}, at specified distances from each roadway (Appendix B-4).

2.3 Railroad Contribution

While location of the Seaboard Coastline Railroad spur which is planned to serve the new mine has not been finalized, railroad traffic along the tentative route proposed in the DRI-ADA (Swift Agricultural Chemicals

Corporation, 1978) and shown in Figure 2.3-1 has been considered in this assessment. It is reasonable to anticipate that an environmental impact analysis for the new railroad will be required and that it will address potential noise impact more exactly than is possible at the present time.

Daily rail traffic volume was determined from data provided in the DRI-ADA and assumed to be equally distributed between day and night hours (rail cars are dispatched to phoshpate mines at whatever time they become available). The average peak noise levels at 100 feet emitted by diesel-electric locomotives (90 dBA) was obtained from EPA's Background Document for Railroad Noise Emissions Standards (1975) and used as the reference value for relating locomotive noise levels to distance from the track. Similarly, EPA's noise emission standard for rail cars (88 dBA for speeds up to and including 45 mph as given in 40 CFR 201.13) was used to predict the rail car contribution at various distance. The above noise levels were utilized along with the number of passbys and time duration per passby to estimate the L_{dn} contribution from the railroad traffic (Appendix C).

3. APPLICABLE STANDARDS AND GUIDELINES

Several federal agencies have established standards, guidelines, and screening criteria in an attempt to control the levels of noise to which the public is subjected. Among these federal agencies are the Environmental Protection Agency, the Department of Housing and Urban Development, and the Federal Highway Administration.

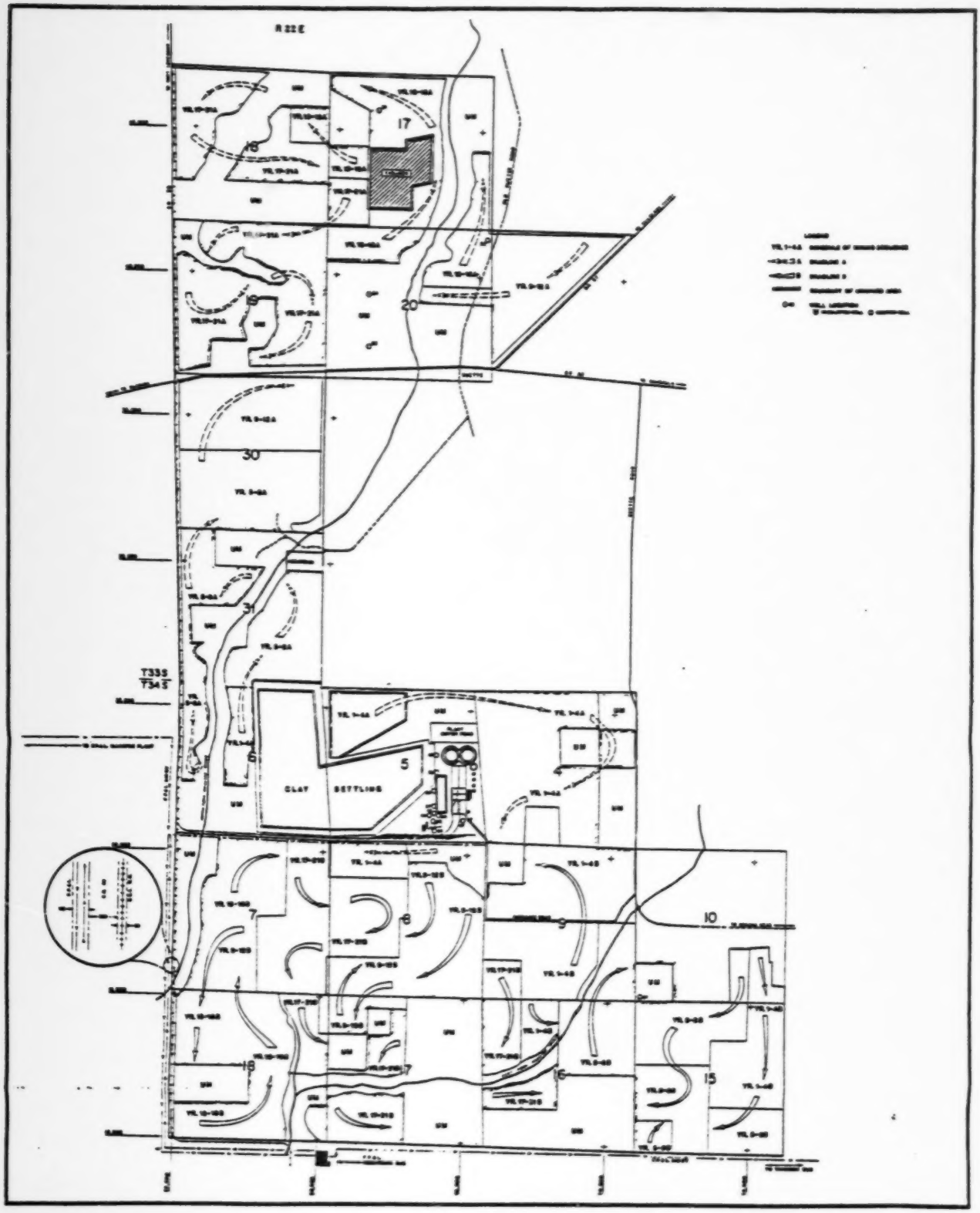

Figure 2.3-1
MAP H

MASTER DEVELOPMENT PLAN
DUETTE MINE

SWIFT AGRICULTURAL CHEMICALS CORPORATION
MANATEE COUNTY, FLORIDA

NORTH
0 1000 2000 3000
SCALE IN FEET

ZELLARS-WILLIAMS, INC.

The Environmental Protection Agency, in Report 550/9-74-004, established a yearly average L_{dn} of 55 dBA as a maximum outdoor noise level at residences with outside space that is requisite to protect public health and welfare with an adequate margin of safety; the corresponding indoor criterion is L_{dn} or 45 dBA (Table 3-A). For educational institutions, EPA identified a yearly average $L_{eq(24)}$ of 55 dBA as the allowable outdoor noise level and a corresponding indoor criterion of 45 dBA. The relationship between L_{dn} and twenty-four L_{eq} can be illustrated by the equation defining L_{dn} in the EPA Report 550/9-74-004 (Ean. A-15).

$$L_{dn} = 10 \log\{\frac{1}{24}[15(10^{L_d/10}) + 9(10^{\frac{L_n+10}{10}})]\}$$

where

L_d = daytime L_{eq} (0700 - 2200 hours)
L_n = nighttime L_{eq} (2200 - 0700 hours)

Note the 10 dBA penalty added to the nighttime L_{eq}. The equation for computing the twenty-four hour L_{eq} is identical to the L_{dn} equation except no penalty is applied to L_n. Both of these noise descriptors are readily calculable from the hourly and average L_{eq} values derived in Section 2.

Sensitive receptors in the vicinity of the proposed mine were also examined by a comparison with FHWA and HUD noise standards. The Federal Highway Administration has specified standard design noise levels for five activity categories (A through E) in FHPM 7-7-3 (Table 3-B). All sensitive receptors near the mine are included in activity category B. The design noise level for activity category B is 67 dBA for the maximum

Table 3-A Yearly Average Equivalent Sound Levels Identified as Requisite to Protect the Public Health and Welfare with an Adequate Margin to Safety (Source: EPA Report 550/1-9-74-004)

	Measure	INDOOR			OUTDOOR		
		Activity Interference	Hearing Loss Consideration	To Protect Against both Effects (b)	Activity Interference	Hearing Loss Consideration	To Protect Against both Effects (b)
Residential with Outside Space and Farm Residences	L_{dn} $L_{eq(24)}$	45	70	45	55	70	55
Residential with no Outside Space	L_{dn} $L_{eq(24)}$	45	70	45			
Commercial	$L_{eq(24)}$	(a)	70	70(c)	(a)	70	70(c)
Inside Transportation	$L_{eq(24)}$ $L_{eq(24)}$	(a)	70	(a)			
Industrial	$L_{eq(24)}$	(a)	70	70(c)	(a)	70	70(c)
Hospitals	L_{dn} $L_{eq(24)}$	45	70	45	55	70	55
Educational	$L_{eq(24)}$ $L_{eq(24)}$	45	70	45	55	70	55
Recreational Areas	$L_{eq(24)}$	(a)	70	70(c)	(a)	70	70(c)
Farm Land and General Unpopulated Land	$L_{eq(24)}$				(a)	70	70(c)

Explanation of identified level for hearing loss: The exposure period which results in hearing loss at the identified level is a period of 40 years.

Code: a. Since different types of activities appear to be associated with different levels, identification of a maximum level for activity interference may be difficult except in those circumstances where speech communication is a critical activity. (See Figure D-2 for noise levels as a function of distance which allow satisfactory communication).

b. Based on lowest level.

c. Based only on hearing loss.

Table 3-B Design Noise Level/Activity Relationships 1/

Activity Category	Design Noise Levels - dBA 2/ $L_{eq}(h)$	$L_{10}(h)$	Description of Activity Category
A 3/	57 (Exterior)	60 (Exterior)	Tracts of land which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B 3/	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	--	--	For requirements on undeveloped lands see paragraphs 11a and c.
E 4/	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

1/ See Paragraph 8 for method of application.
2/ Either L_{10} or L_{eq} (but not both) design noise levels may be used on a project.
3/ Parks in Categories A and B include all such lands (public or private which are actually used as parks as well as those public lands officially set aside or designated by a governmental agency as parks on the date of public knowledge of the proposed highway project.
4/ See Paragraphs 8c, d, and e for method of application.

hourly L_{eq}. Minor manipulation of the equivalent noise levels computed for the primary source contribution (Section 2) were required to arrive at a total maximum hourly L_{eq} comparable to FHWA's design noise level. Since the mine facilities will emit nearly constant noise levels during its hours of operation, the maximum $L_{eq(h)}$ will be essentially the same as the average $L_{eq(h)}$ values determined through the monitoring program (Section 2).

The basis for computing the maximum $L_{eq(h)}$ generated by traffic is given in FHPM 7-7-3 as the average of the three peak traffic hours of a typical day. The maximum $L_{eq(h)}$ for the third major source — the railroad, was conservatively assumed to equal the peak L_{eq} during a train passby even though the duration of each passby is considerably less than one hour.

The Department of Housing and Urban Development, in Circular 1390.2, promulgated minimum standards with respect to noise abatement and control in order to protect citizens against the encroachment of noise into their communities and places of residence. HUD external noise exposure standards for new construction sites are displayed in Table 3-C. The standards are divided into three general groupings of noise exposure: acceptable, discretionary, and unacceptable. Discretionary exposures may be subdivided into the categories of normally acceptable and normally unacceptable. HUD standards are described in terms of noise exceedance levels. As pointed out in EPA's Report 550/9-74-004 there is no unique relationship between HUD's noise descriptors and L_{eq}. The relationship can vary considerably depending upon the time distribution of noise levels. Nevertheless, the maximum hourly L_{eq} described above

Table 3-C HUD General External Noise Exposure Standards for New Construction Sites (dBA)

	$L_{33.3}$	$L_{4.25}$	$L_{2.08}$
UNACCEPTABLE: Exceeds 80 dBA 60 minutes per 24 hours		> 80	
Exceeds 75 dBA 8 hours per 24 hours	> 75		
DISCRETIONARY-NORMALLY UNACCEPTABLE: Exceeds 65 dBA 8 hours per 24 hours	> 65		
DISCRETIONARY-NORMALLY ACCEPTABLE: Does not exceed 65 dBA more than 8 hours per 24 hours	$\leq$ 65		
ACCEPTABLE: Does not exceed 45 dBA more than 30 minutes per 24 hours			$\leq$ 45

should provide a fair estimate of the $L_{4.25}$ exceedance level and a very conservative estimate of the $L_{33.3}$ noise level inasmuch as these exceedance levels are determined for relatively long periods of time.

4. CUMULATIVE NOISE LEVEL PROJECTIONS

4.1 Methodology

The cumulative L_{dn} levels around the site boundary and at the sensitive receptor locations were determined by summation of the L_{dn} contributions from the three major noise sources — the mine, roadways, and railroad — along with the background noise. Multiple L_{dn} contributions at an observation point are added logarithmically to obtain the total L_{dn}.

$$\text{Total } L_{dn} = 10 \log\left[10^{\left(\frac{L_{dn/mine}}{10}\right)} + 10^{\left(\frac{L_{dn/road}}{10}\right)} + 10^{\left(\frac{L_{dn/rail}}{10}\right)} + 10^{\left(\frac{L_{dn/background}}{10}\right)}\right]$$

At nearly every location examined, the background noise of 35 dBA was negligibly small in comparison with the other sources.

In order to obtain more realistic predictions of total L_{dn} values with which to more accurately assess the impact, the above predictions were adjusted to account for sound attenuation due to ground and terrain effects. For the thick grass and shrub vegetation characteristic of most of site and adjacent properties, a ground attenuation of 4.1 dBA/100 ft. is appropriate (Beranek, 1971) within a range extending to 20 dBA. This attenuation rate was applied to each site except the church and school (Site 1) where a minimal 0.77 dBA/100 ft. factor (Beranek, 1971)

was applied due to the short grass ground cover between the receptors and the primary noise source — State Road 62.

4.2 Results and Discussion

The results of the cumulative L_{dn} computations assuming the free field model are displayed graphically in Figure 4.2-1 through a series of constant noise level contour lines. The contours displayed are conservative estimates of the L_{dn} 55 and L_{dn} 65 noise levels along various sections of property boundary and function as a screening criterion to identify potential problem receptors. These contours do not represent noise levels at any one point in time, but rather a composite estimate of values experienced at all locations throughout the life of the mine. Inasmuch as the dragline and earth moving equipment will be continually shifting their locations during the mining operation, the time of exposure to noise from these sources will be limited to a few weeks or months at most.

The contours achieve a screening effect for two reasons. If the peak daily L_{dn} levels were adjusted to account for the above effect and reflected average annual L_{dn} values, which is the basis of EPA's criterion, some downward adjustment would certainly occur. Further, since none of the natural mechanisms of sound attenuation other than wave divergence were taken into account by the free field model, the L_{dn} 55 contour depicted in Figure 4.2-1 reflects an extra degree of conservatism.

The cumulative L_{dn} values predicted with the free field assumption at the exact locations of sensitive receptors are presented in Table 4.2-A.

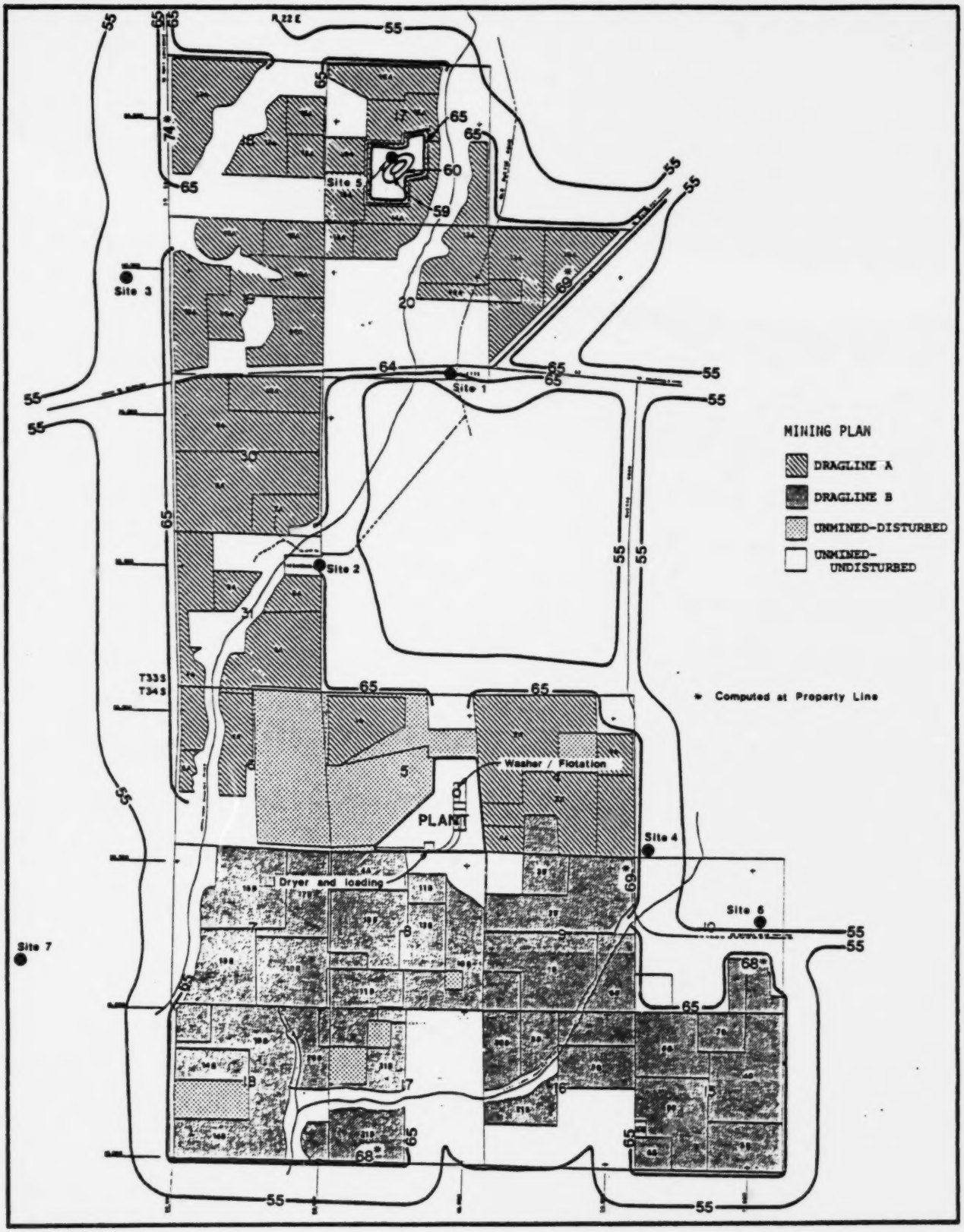

Figure 4.2-1

Estimated Day-Night Average Sound Level (L_{dn}) Contours at Duette Mine during operation

DUETTE MINE

Conservation Consultants Inc.

Table 4.2-A Projected Day-Night Average Sound Levels (L_{dn}) at Sensitive Receptors

Receptor Site	FREE FIELD									Total L_{dn} with attenuation from ground effects
	Mine Related Leq						L_{dn} Road-way	L_{dn} Rail-way	Total L_{dn}	
	Dragline	Water Flot.	Dryer	Land Clear	Reclamation	Total Mine L_{dn}				
1										
Church	42	35	32	61	53	57	60	53	62	59
School	41	35	32	58	51	55	56	53	60	53
2	57	38	36	60	62	65	35	53	65	51
3	42	37	35	54	54	54	44	60	61	42
4	47	41	38	57	57	58	44	44	58	41
5	49	35	35	59	59	59	35	54	60	42
6	46	36	34	56	54	57	49	43	58	46
7	35	35	35	41	41	45	35	56	56	40

The screening indicates that the L_{dn} 55 dBA encloses six of the seven sensitive receptors. The largest predicted L_{dn} is 65 dBA at Site 2 — a private residence in Keentown as indicated in Table 4.2-A. The largest contributors to the total L_{dn} at Site 2 are the mobile mine related sources including the dragline and land clearing and reclamation activities. A slightly lower total L_{dn} (62 dBA) is predicted at the church on State Road 62 at which point the road is the largest contributor to the total L_{dn}. The total mine L_{dn}, particularly the land clearing (or reclamation) activity, also makes a significant contribution. Total L_{dn} values at the remaining impacted sites range from 57 to 59 dBA. With the exception of Site 3 which is influenced primarily by railroad noise, the predominant noise contribution comes from transient mining, land clearing, and reclamation activities. Noise levels emitted from the plant area do not have a noticeable influence at any of seven receptor sites.

Of the two effects not included in the screening procedure, only one could be conveniently quantified — ground and terrain attenuation. Noise levels adjusted for this effect are also listed in Table 4.2-A and show that the Dry Prairie Baptist Church is the only receptor at which 55 dBA is exceeded. Because of the continued movement of the mining activity, the yearly average L_{dn} would expectedly be lower than the maximum 24-hour value and possibly below the 55 dBA criterion.

Activities at the church are conducted predominantly indoors, and the comparison with the interior noise criterion is more realistic. EPA specifies a yearly average 24-hour equivalent sound level (L_{eq}) of 45 dBA

as requisite to avoid interference with indoor activities in educational institutions (Table 3-A). The same criterion may reasonably be applied to churches as well. While the indoor 24-hour L_{eq} was not computed for the church, a comparison with the predicted interior L_{dn} values adequately illustrates the degree of impact inasmuch as the L_{dn} computation adds a 10 dBA penalty to nighttime L_{eq} values. The interior L_{dn} was predicted by subtracting 15 dBA from the exterior L_{dn} (59 dBA) which is the recommended reduction in exterior noise level for a building with partly opened windows (EPA, 1974). As the 24-hour L_{eq} will always be less than the L_{dn}, the 24-hour L_{eq} inside the church may be expected to be less than the predicted L_{dn} of 44 dBA and thus satisfy the EPA's 45 dBA criterion.

Among the sources impacting the church, the combined mine and non-mine traffic on S. R. 62 in 1982 is alone expected to generate a 24-hour L_{dn} of 58 dBA at the church site. The ninety-three percent (93%) of projected traffic volume in 1982 that will be unrelated to the proposed mine will by itself generate a 24-hour L_{dn} of approximately 57 dBA. Hence, the non-mine traffic is the largest single contributor to the total L_{dn} at the church, and by itself exceeds EPA's outdoor criterior of 55 dBA.

Since a major contribution of the noise is from the roadway, hourly L_{eq} was estimated at the church in accordance with Federal Highway Administration guideline procedures (FHWA, 1976) and compared with that agency's design noise levels for exterior and interior activities. An exterior hourly L_{eq} of 55 dBA was predicted at the church which satisfies the FHWA of 67 dBA allowable design noise level for Activity

Category B which includes residences, schools, and churches. Similarly, the estimated interior hourly L_{eq} value of 45 dBA is within the allowable FHWA interior noise level of 52 dBA.

The projected peak hourly L_{eq} at the church was computed for comparison with the U. S. Department of Housing and Urban Development $L_{4.25}$ and $L_{33.3}$ maximum criteria of 80 and 65 dBA before noise levels become "unacceptable" and "normally unacceptable", respectively (HUD, 1971). The estimated hourly L_{eq} of 55 dBA suggests that both of these criteria would also be satisfied.

During the noise monitoring program at the Silver City Mine (Section 2.1) special attention was paid to noises that could be considered intrusive because of spectral content or intermittency. This included octave band measurements at the various facilities and equipment to detect the presence of pure tones (Appendix A). Only the dragline was found to produce a noticeable pure tone which consisted of an occasional squeak in the 1000 to 2000 Hz range. The squeak was apparently caused by rubbing parts in the bucket linkage of the dragline being observed and would typically be remedied through lubrication.

One noticeably loud, intermittent noise was measured at the wet-rock loading facility where a rail car shaker emitted 5-second bursts of 81 dBA sound (at 300 ft.) every 10 to 15 minutes. At the nearest sensitive receptor (Site 6) approximately 1.5 miles from the proposed loading facility the noise contributed by the rail car shaker will be no greater than background level.

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APPENDIX A

Noise Monitoring Program
Swift Agricultural Chemicals Corp.
Silver City Mine

Conducted By

Conservation Consultants, Inc.
and
Fagen and Associates, Inc.

November, 1978

This Appendix presents the raw data collected during the noise monitoring program at the Silver City Mine, along with a brief explanation of the data reduction method and a tabulated summary of the results.

Data Collection

Pages A-2 through A-8 present the data recorded during the test. At the site of each facility (which usually included a grouping of operations and equipment) several readings of sound pressure levels were recorded. The instruments used, the operators, time interval of measurement and appropriate meteorological conditions were recorded. Monitoring was conducted only at windspeeds below 10 knots and relative humidities less than 90 percent (as determined by sling psychometer). Prior to monitoring the GR 1945 was calibrated with a B and K Model 9320 Sound Level Calibrator.

Data Reduction

Most of the measurements were made at a sufficient distance from the source to avoid near-field effects. Directivity of the sources was conservatively accounted for by using the maximum measured sound pressure level (SPL) at a given distance from the source as the basis for developing SPL versus distance relationships. These relationships were developed for each source from the following equation (Beranek, 1971)

$$SPL_2 = SPL_1 - 20 \log_{10} \left(\frac{r_2}{r_1}\right)$$

where r, was the distance in the far field at which SPL, was measured. The resulting relationships for each source are listed in Table A-1, along with expressions for computing the equivalent sound level (L_{eq}) and day-night average sound levels (L_{dn}) for the mine related activities.

Swift Agricultural Chemicals Corporation
Silver City Mine
Noise Source Monitoring for Duette Mine EIS
CCI Job No. 0100-013

Date: November 6, 1978

Location: Dragline and Pit (only dragline operating pit-pump down)
Instrument: General Radio 1945 - A-weighted network
Operators: Dave Fagen and Dick Eckenrod
Dry Bulb Temperature: 74°F
Wet Bulb Temperature: 71
Relative Humidity (R.H.): 81%
Wind Speed: Variable up to 4 mph
Time: 0954
Distance from Dragline: 203 ft.

Time	Sound Pressure Level (SPL), dBA
0959	62
1000	60
1001	58
1002	58
1003	57
1004	58
1005	56
1006	57
1008	59
1010	56

Note: Peak SPL of 62 dBA was reached during turning manuever of the dragline. The minimum level of 55 dBA reached when facing the rear of the dragline cab.

Location: Land Reclamation Site
Activity: Earthmoving equipment (payscrapers and bulldozers) delivering dirt to the site and grading it. (no appreciable background noise)
Instrument: General Radio 1945
Dry Bulb Temperature: 83°F
Wet Bulb Temperature: 74°F
Relative Humidity: 66%
Wind Speed: Variable to 6 knots
Distance from Source: Centrally located activity approximately 200 ft. with nearest vehicle passing within about 30 ft.
Start Time: 1115

Time	Sound Pressure Level (SPL), dBA
1123	72
1124	74
	Peak of 93 observed during this interval as payscraper passed at 30 ft.
1125	76
1126	76
1127	78
1128	73
1129	75
1130	82
1131	75
1132	74
1133	75
1134	75

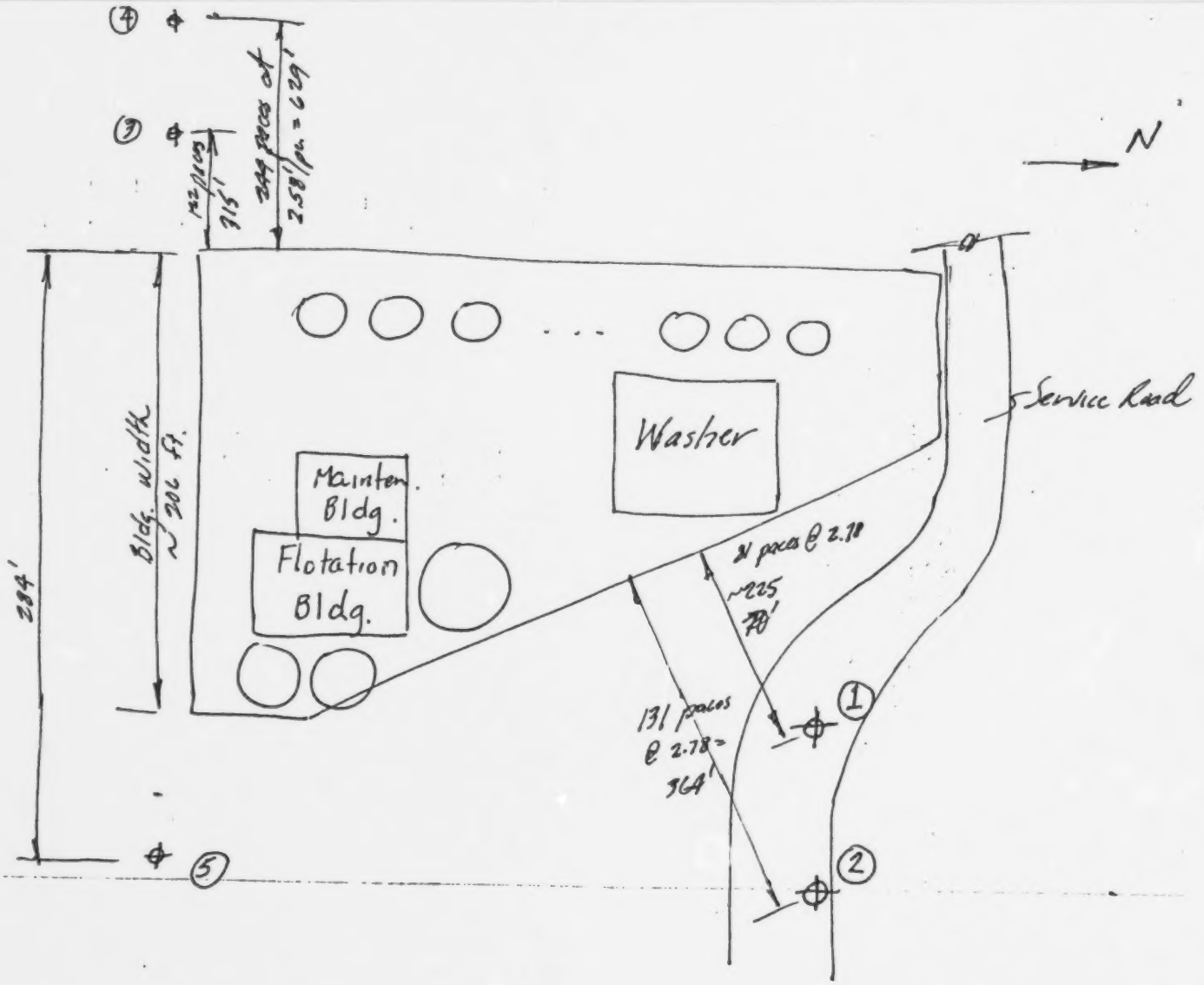
At end of 1/2 hour monitoring: 1145

L_{max}	93
$L_{0.1}$	93
L_1	87
L_{10}	81
L_{50}	74
L_{90}	67
L_{99}	40
L_{min}	36
.5/24	85
1/24	84
8/24	76
.5/8	82
L_2	85
L_5	83
L_{20}	78
L_{eq}	78

Location: Washer/Flotation Facility (layout of Facility and location of monitoring site shown on following page.)
Insturment: General Radio 1945
Dry Bulb Temperature: 85°F
Wet Bulb Temperature: 73°F
Relative Humidity: 58%
Wind Speed: < 2 knots
Time: 1332

Station 1

Distance from Source: 225 ft.
SPL_{avg}: 72 dBA
Range: 72-73
Maximum: 73
Minimum: 72


4
3
Washer
Maintan. Bldg.
Flotation Bldg.
Service Road
N
1
2
5
394'
Bldg. width ~ 306 ft.
131 spaces @ 2.78 = 364'
24 spaces @ 2.10 ~225 210'

A-4

Station 2:

Distance from Source: 364 ft.
Time: 1338 (3 minute interval)
SPL_{avg}: 66 dBA
Range: 66-67
Maximum: 67
Minimum: 66

Station 3:

Distance from Source: 315 ft.
Time: 1345 (3 minute interval)
SPL_{avg}: 67 dBA
Range: 66-68 dBA

Station 4:

Distance from Source: 630 ft.
Time: 1352 (3 minute interval)
SPL_{avg}: 62 dBA
Range: 61-63 dBA

Station 5

Distance from Source: 77 ft.
SPL_{avg}: 70 dBA
Range: 69-71

Note: At 1409 an SPL of 81 dBA was measured with car shaker operating. Distance ∿ 300 ft.

Location: Dragline and Pit pump (second session)
Instrument: General Radio 1945
Dry Bulb Temperature: 84°F
Wet Bulb Temperature: 71°F
Relative Humidity: 4-8 mph
Start Time: 14:38
Stop Time: 15:08

Results of 30 minute run:

L_{max}	= 68	.5/24	= 59
$L_{0.1}$	= 65	1/24	= 58
L_1	= 61	8/24	= 55
L_{10}	= 57	.5/8	= 57
L_{50}	= 55	L_2	= 59
L_{90}	= 53	L_5	= 58
L_{99}	= 51	L_{20}	= 56
L_{min}	= 49	L_{eq}	= 55

Note: Airplane flyover at 15:07 increased peak to 68 dBA and average of ∿ 65 dB for a 15 second period.

Location: Vertical Turbine Pump (return water to pit pump)
Instrument: General Radio 1945
Time: 15:22

The pump emitted a constant SPL of 73 dB at 40 ft.

At 80 ft. SPL = 67 dB
At 260 ft. SPL = 56 dB

Swift Silver City Mine
Noise Source Monitoring Program for Duette EIS
CCI Project No. 0100-013

Date: November 15, 1978

Instrument: General Radio 1945
Dry Bulb Temperature: 80°F
Wet Bulb Temperature: 72°F
Relative Humidity: 9%
Windspeed: < 2 mph

Grinding Mills: 2 mills operating which is normal; ad other equipment in vicinity shut-dowm except for occasional railcar movement.

Station 1

SPL: 71
Range: 70-72 dB

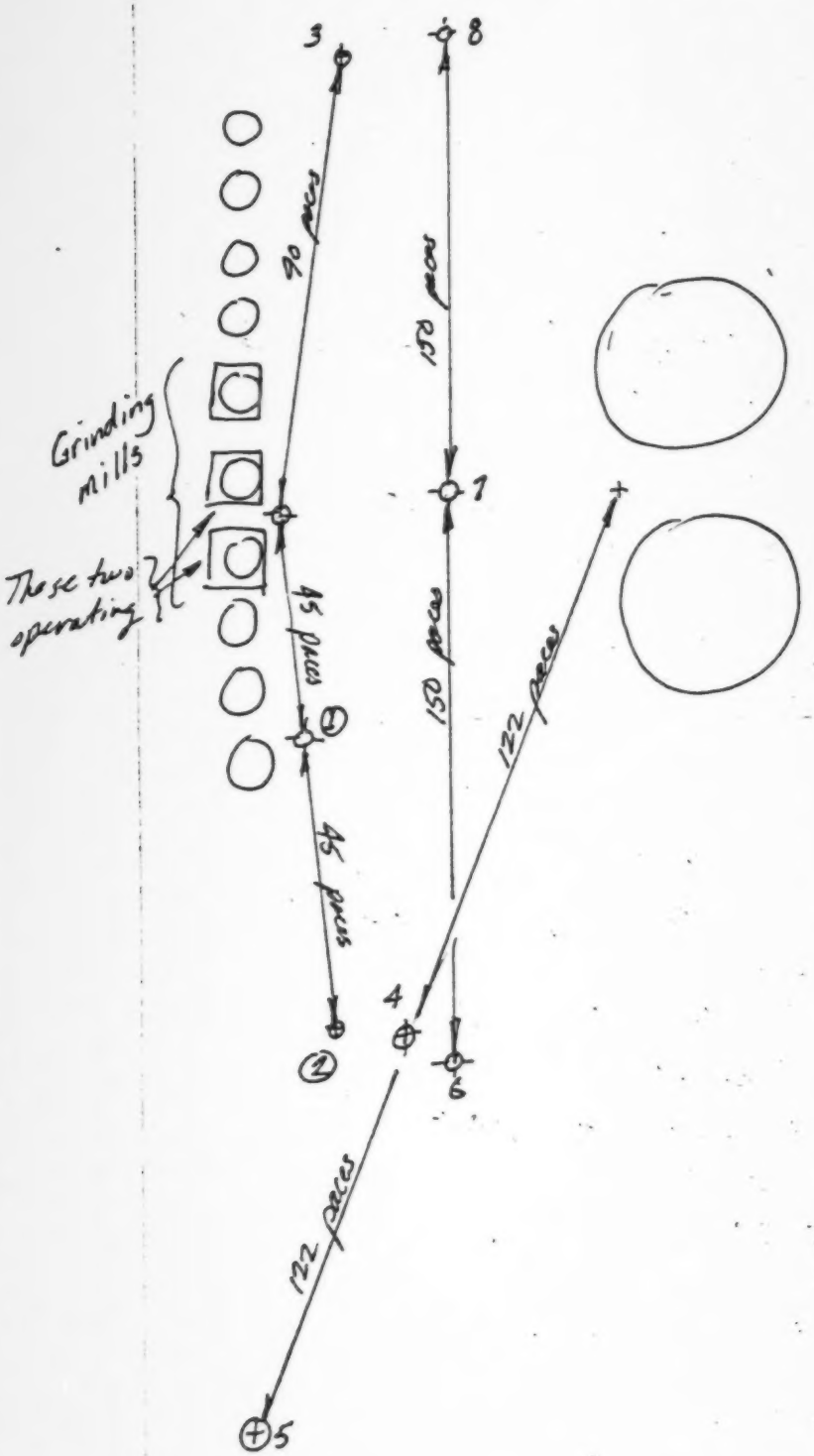
Results of 1/2 hour run at Station 1:

L_{max}	= 76	.5/24	= 72
$L_{0.1}$	= 75	1/24	= 72
L_1	= 73	8/24	= 71
L_{10}	= 72	.5/8	= 72
L_{50}	= 71	L_2	= 72
L_{90}	= 70	L_5	= 72
L_{99}	= 69	L_{20}	= 71
L_{min}	= 68	L_{eq}	= 71

Note: The high L_{max} due to occasional buzzer sounding from control room; occurred twice during the 1/2 hour run.

Station 2

SPL_2: 66 dB
Range: 65-68 dB


3
8
20 pcs
150 pcs
Grinding mills
These two operating
45 pcs
150 pcs
122 pcs
1
7
45 pcs
4
2
6
122 pcs
5

Station 3

SPL_3: 66 dB
Range: 65-68 dB

Rock Dryers Only with grinding mill shut down:

Station 4

SPL_4: 66 dB
Range: 65-67

Station 5

SPL_5: 60 dB
Range: 59-61

Location: Rock Dryers and Grinding Mills Combined
Time: 19:03

Station 6

SPL_6: 63 dB
Range: 62-64 dB
Distance: 150 paces from center of sources

Station 7

Location: In center of sources
SPL: 81 dB

Results of 1/2 hour run:
Start: 19:14
Stop: 19:44

L_{max}	= 86	.5/24	= 83
$L_{0.1}$	= 85	1/24	= 83
L_1	= 83	8/24	= 82
L_{10}	= 82	.5/8	= 82
L_{50}	= 82	L_2	= 83
L_{90}	= 81	L_5	= 83
L_{99}	= 80	L_{20}	= 82
L_{min}	= 79	L_{eq}	= 82

Station 8

Location: 150 paces in opposite direction of Station 6
SPL_8: 63 dB
Range: 65-62 dB

FAGEN & ASSOCIATES, INC. CONSULTANTS IN ACOUSTICS
2311 ANDALUSIA WAY N.E., ST. PETERSBURG, FLORIDA 33704 (813) 823-3564

29 January 1979

Mr. Dick Eckenrod
Conservation Consultants, Inc.
P.O. Box 35
Palmetto, Fla 33561

Re: Duette Mine
F/A File 1180A

Dear Dick:

During our testing at the Duette Mine, two types of equipment were used. One was a GenRad model 1945 Community Noise Analyzer which has the built in capability of doing a statistical analysis of the A-weighted noise level as a function of exceedance levels as a percentage of time. This unit was used for the majority of our tests.

The other unit was a Bruel and Kjaer Precision Sound Level Meter, Model 2204S fitted with an Octave Band filter unit Model 1613. This unit was used to do some Octave Band Measurements and to search, primarily, for pure tones. The octave band filters, per se, do not have the narrow range capability to exactly pinpoint pure tones. However, by listening to the source then listening through the headset it is possible to determine the frequency range, within an octave, of a pure tone. During our observations there was only one area wherin a pure tone was noticeable. This was adjacent to the dragline. The tone occured between 1000 and 2000 Hz. Our observations noted that this was not excessive toward the overall noise level and that apparently the noise was due to a sheave or hinge pin on the dragline bucket. All that was required is a squirt of oil. Obviously this will occur periodically, but it nothing to be alarmed about.

At other observation locations there was no evidence of pure tones.

Sincerely,

FAGEN & ASSOCIATES, INC.

David G. Fagen, Jr.

57

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Table A-1 Summary of Mine Related Noise Level Equations.

1. L_{eq} (D.L.) = 61.4 - 20 log ($^{r}/_{200}$)

2. L_{eq} (W.F.) = 72 - 20 log ($^{r}/_{200}$)

3. L_{eq} (D.F.) = 70 - 20 log ($^{r}/_{200}$)

4. L_{eq} (L.C.) = 74 - 20 log ($^{r}/_{200}$)

5. L_{eq} (REC) = 74 - 20 log ($^{r}/_{200}$)

6. L_{eq} (Day) = 10 log {1/15[8($10^{L_{eq}(D.L.)/10} + 10^{L_{eq}(W.F.)/10} + 10^{L_{eq}(D.F.)/10} + 10^{L_{eq}(REC)/10}$) + 7($10^{L_{eq}(D.L.)/10} + 10^{L_{eq}(W.F.)/10} + 10^{L_{eq}(D.F.)/10}$)]}

7. L_{eq} (Night) = 10 log ($10^{L_{eq}(D.L.)/10} + 10^{L_{eq}(W.F.)/10} + 10^{L_{eq}(D.F.)/10}$)

8. L_{dn} (Mine Related) = 10 log{1/24 [15($10^{L_{eq}(Day)/10}$) + 9 ($10^{(L_{eq}(night) + 10)/10}$)]}

Where

D.L. = Dragline
W.F. = Water Flotation Facility
D.F. = Dryer Facility
L.C. = Landclearing Operation
REC. = Reclamation Operation

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PALMETTO, FLORIDA 33561
(813) 722-6668

JOB Swift Agricultural Chemicals Corp.
SHEET NO _____ OF _____
CALCULATED BY RME DATE 1/28/79
CHECKED BY _____ DATE _____
SCALE _____

Conversion from Roadway L_{50}'s to L_{eq}'s.

For a normal frequency distribution of sound levels which is characteristic of highway noise (Alexandre, et.al., 1975) i.e., > 100 vehicles/hour, L_{50} and L_{eq} are related as follows (EPA, 550/9-74-004)

$$L_{eq} = L_{50} + 0.115\ S^2$$

where S = standard deviation in dB

Baseline measurements conducted at Site 1 (Duette) during noise baseline study indicated highest traffic volumes of any of the sites and show a near normal distribution with standard deviation of 6.8 dB (attached graph). This will best represent the 1982 project traffic volumes and associated noise:

$$L_{eq} = L_{50} + 0.115\ (6.8)^2 = L_{50} + 5.3$$

FORM 204-1 Available from NEBS Inc. Groton, Mass. 01450

APPENDIX B

ROADWAY NOISE COMPUTATIONS

CONSERVATION CONSULTANTS, INC.
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SHEET NO. Noise Impact OF
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Appendix B-1.
Estimated Average Annual Daily Traffic Flow, AADT For Base year 1982.

Location	1980* AADT	1982** AADT	MINE Generated	Total AADT	Peak Volume*** Factor
S.R. 62 (west of S.R. 37)	2237	2610	190	2800	0.065
S.R. 62 (East of S.R. 37)	1804	2100	460	2560	0.065
S.R. 39	1522	1780	290	2070	0.060
S.R. 37	1477	1720	350	2070	0.050
Duette Rd. (N. of Entrance)	272	320	1290	1610	0.065
Duette Rd. (S. of Entrance)	272	320	340	660	0.065

* From DRI Table 31.B(1) and Map I.6

** Based on 8 percent annual growth rate.

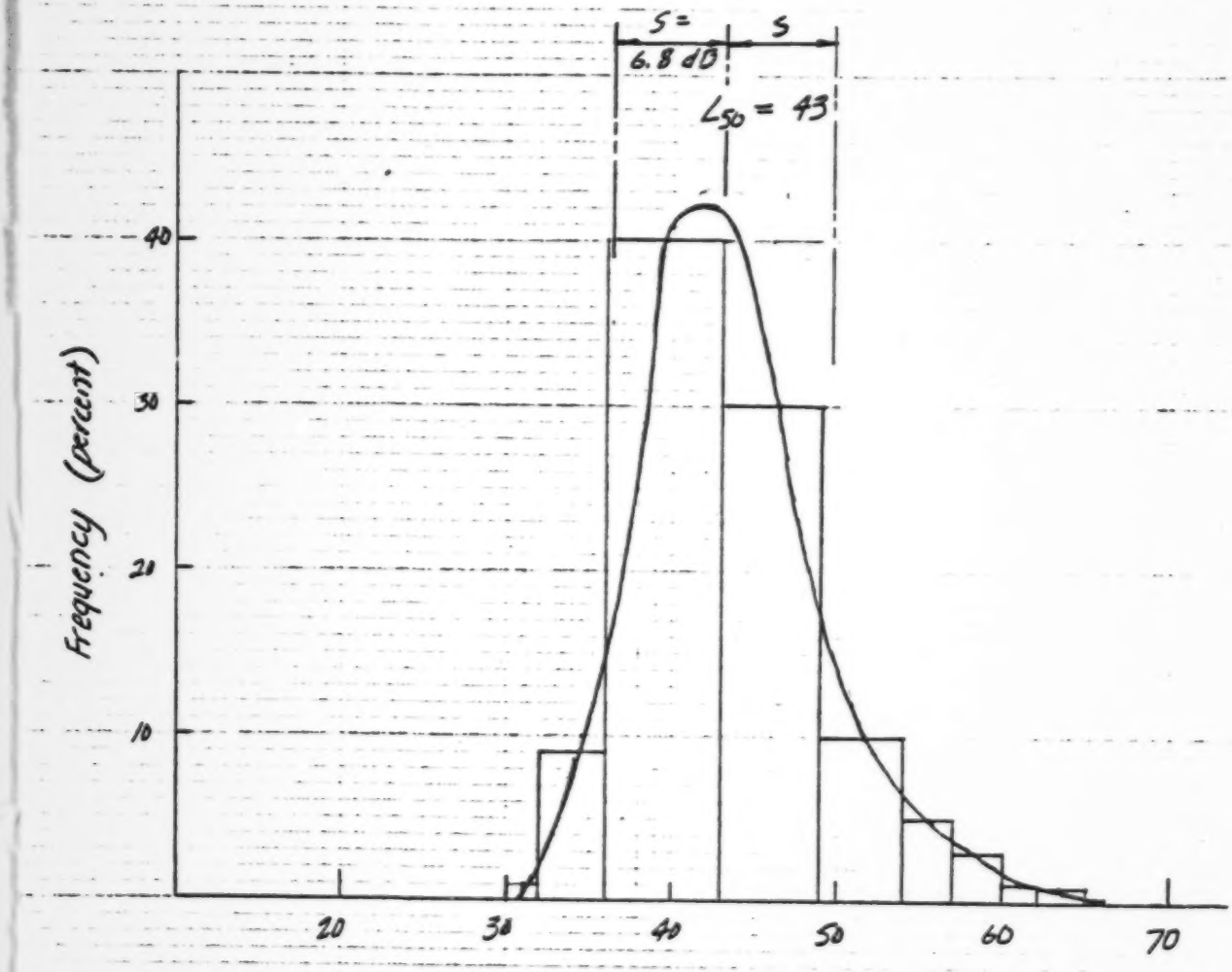
*** From DRI pg. 182; estimated on Duette Rd.

FORM 204-1 Available from VEBA Inc. Groton, Mass. 01450

Duette - Site 1

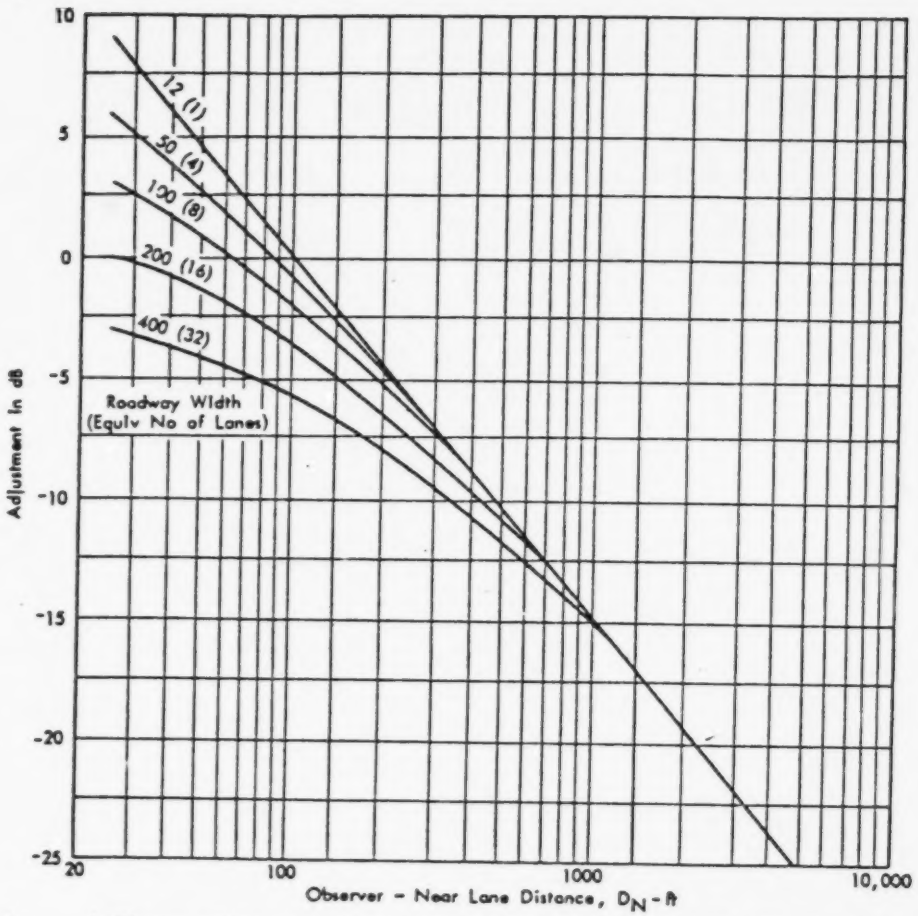
Traffic Noise Frequency Distribution

Traffic Count: 50 vehicles/hour



RME
12/8/77

APPENDIX B-3



Distance adjustment to account for observer-near lane distance and width of roadway.

Source: Highway Noise - A Design Guide for Highway Engineers, National Cooperative Highway Research Program Report No. 117

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JOB Swift Ductile EIS
SHEET NO. _____ OF _____
CALCULATED BY RME DATE 2/2/79
CHECKED BY _____ DATE _____
SCALE _____

Appendix B-4

Leq Due to Traffic @ 100 feet from Roadway

Site	Time Interval 6:30 - 7:30 AM	10:00 - 11:00 AM	2:30 - 3:30 PM	4:00 - 5:00 PM	10:30 - 11:30 PM	All other Hours
1	57.62	61.11	57.47	58.00	57.47	56.95
2	57.07	59.69	56.24	56.78	56.24	55.83
3	55.18	57.50	54.40	55.09	54.40	54.30
4	55.41	55.80	54.18	55.09	54.18	54.03
5	56.48	51.70	49.87	50.63	49.87	50.12
6	47.44	46.00	42.97	43.74	42.97	43.46
7 (Plant Entrance Rd)	57.65	50.04	51.88	50.04	51.88	49.34

FORM 204-1 Available from NEBS Inc., Groton, Mass. 01450

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SHEET NO Noise Impact OF
CALCULATED BY DMS DATE 2/28/79
CHECKED BY DATE
SCALE

Appendix D-4
(Continued)

Summary of Traffic Related Day - Night Sound Level (LDN) Equation.

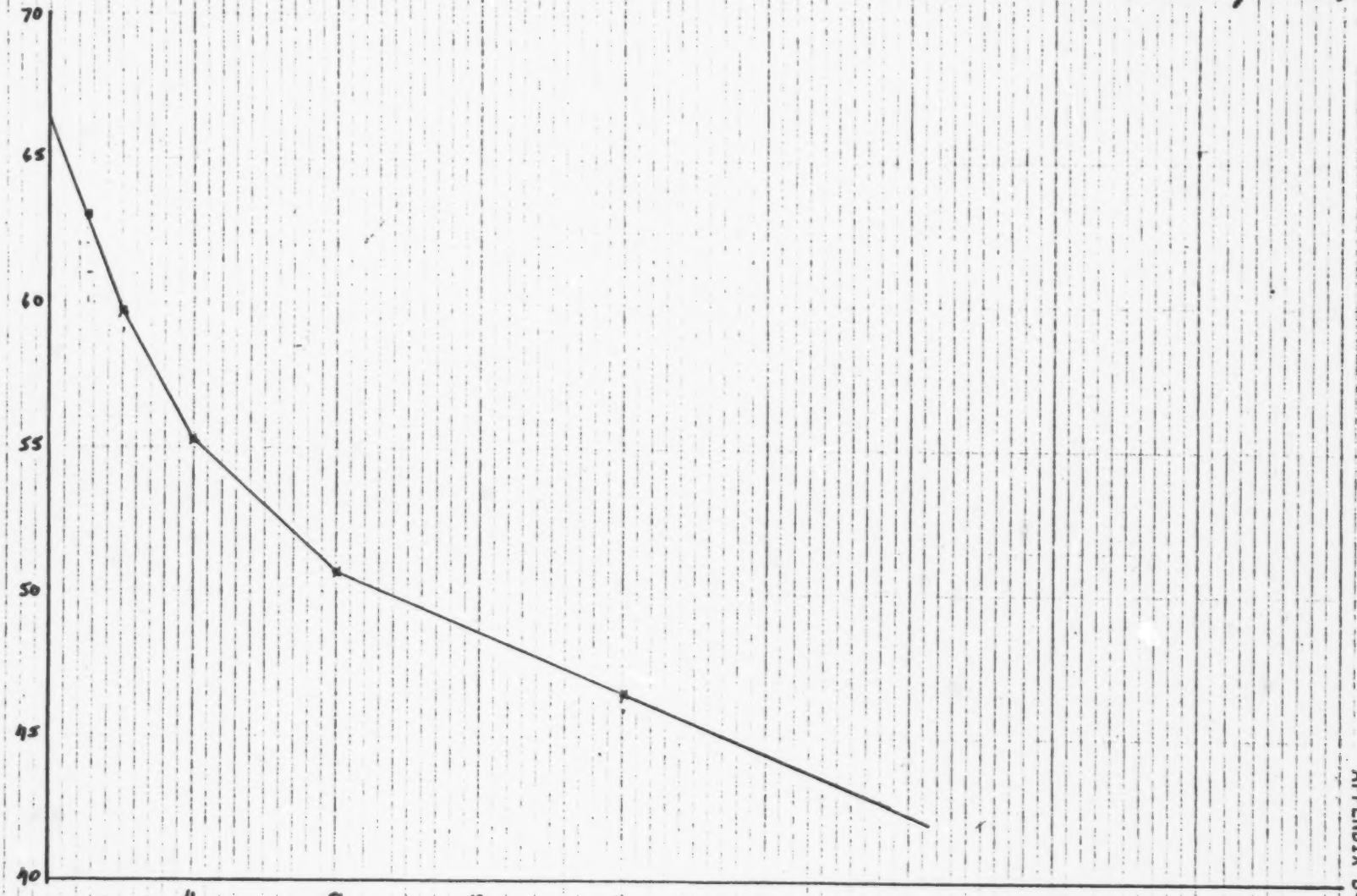
$$L_{DN} = 10 \log \left\{ 1/24 \left[0.5 \left(10^{Leq(6:30-7:30)/10} \right) + 1.0 \left(10^{Leq(10:00-11:00)/10} \right) + 1.0 \left(10^{Leq(2:30-3:30)/10} \right) + 1.0 \left(10^{Leq(4:00-5:00)/10} \right) + 11.5 \left(10^{Leq(Avg.)/10} \right) + 0.5 \left(10^{Leq(6:30-7:30)+10/10} \right) + 1.0 \left(10^{Leq(2:30-3:30)+10/10} \right) + 7.5 \left(10^{Leq(Avg)+10/10} \right) \right] \right\}$$

where

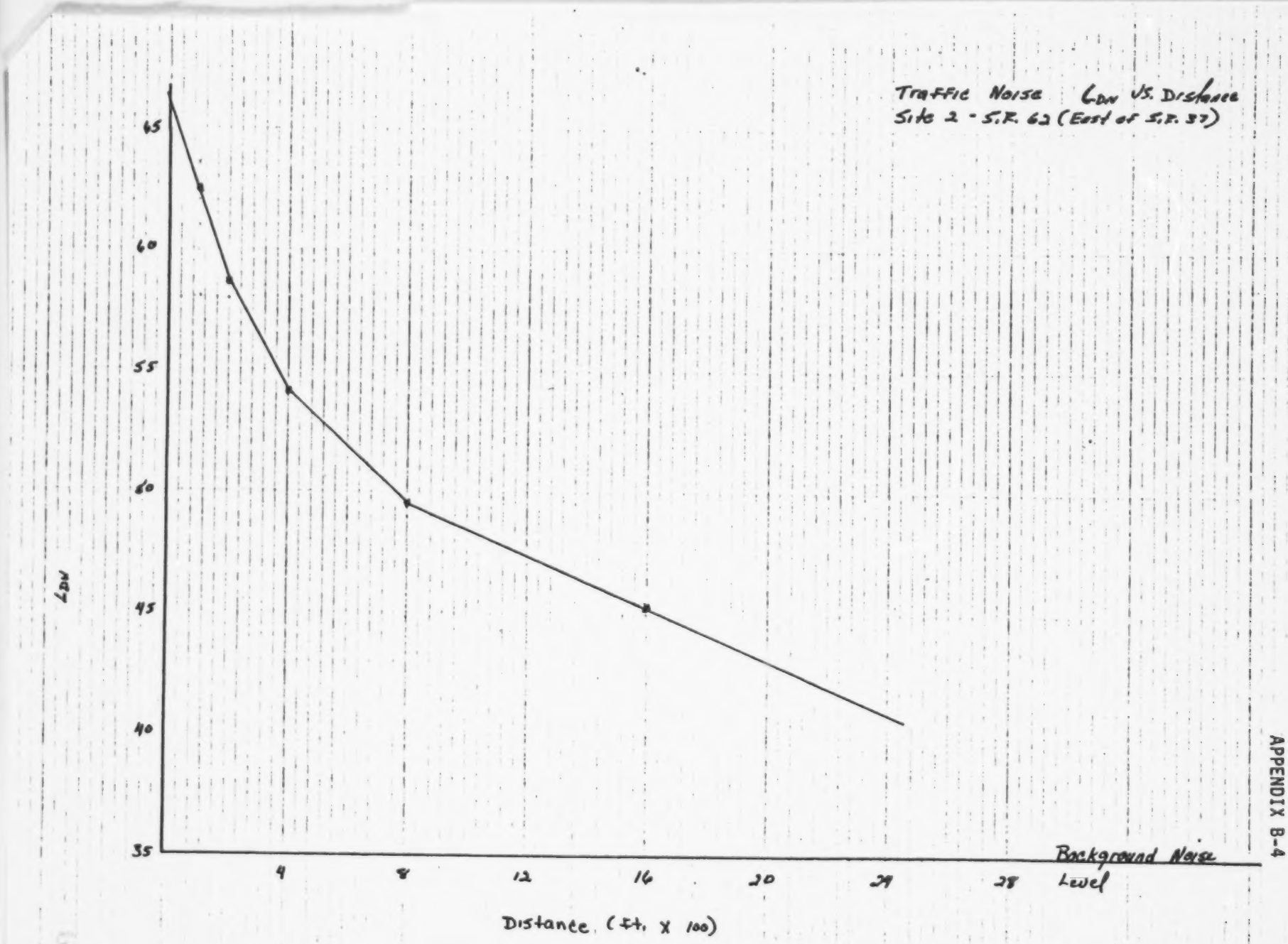
$Leq(Avg)$ = Leq for all hours other than listed.

FORM 204-1 Available from VERB Inc., Groton, Mass. 01450

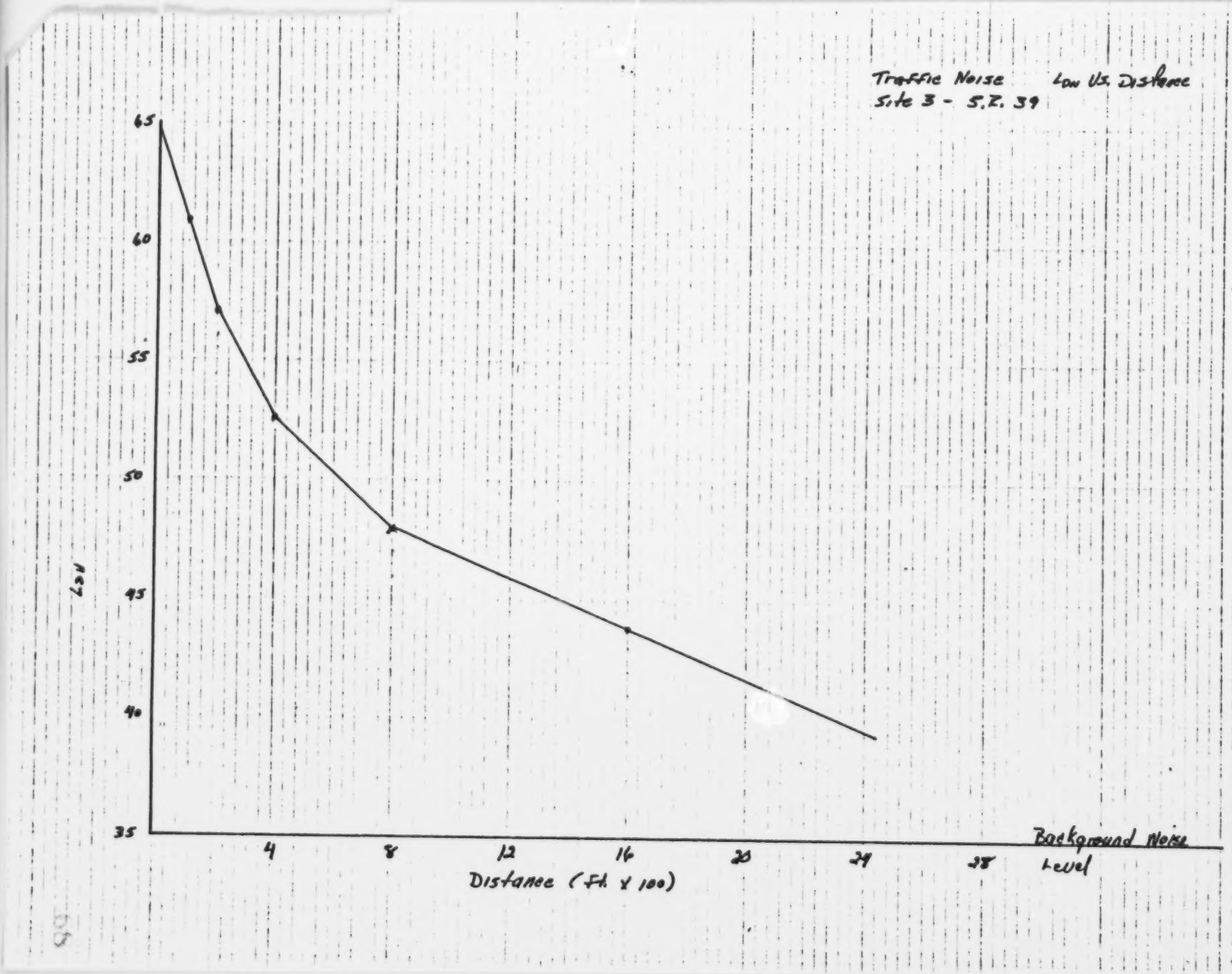
Traffic Noise Ldn vs. Distance
Site 1 - S.R. 62 (West of S.R. 37)



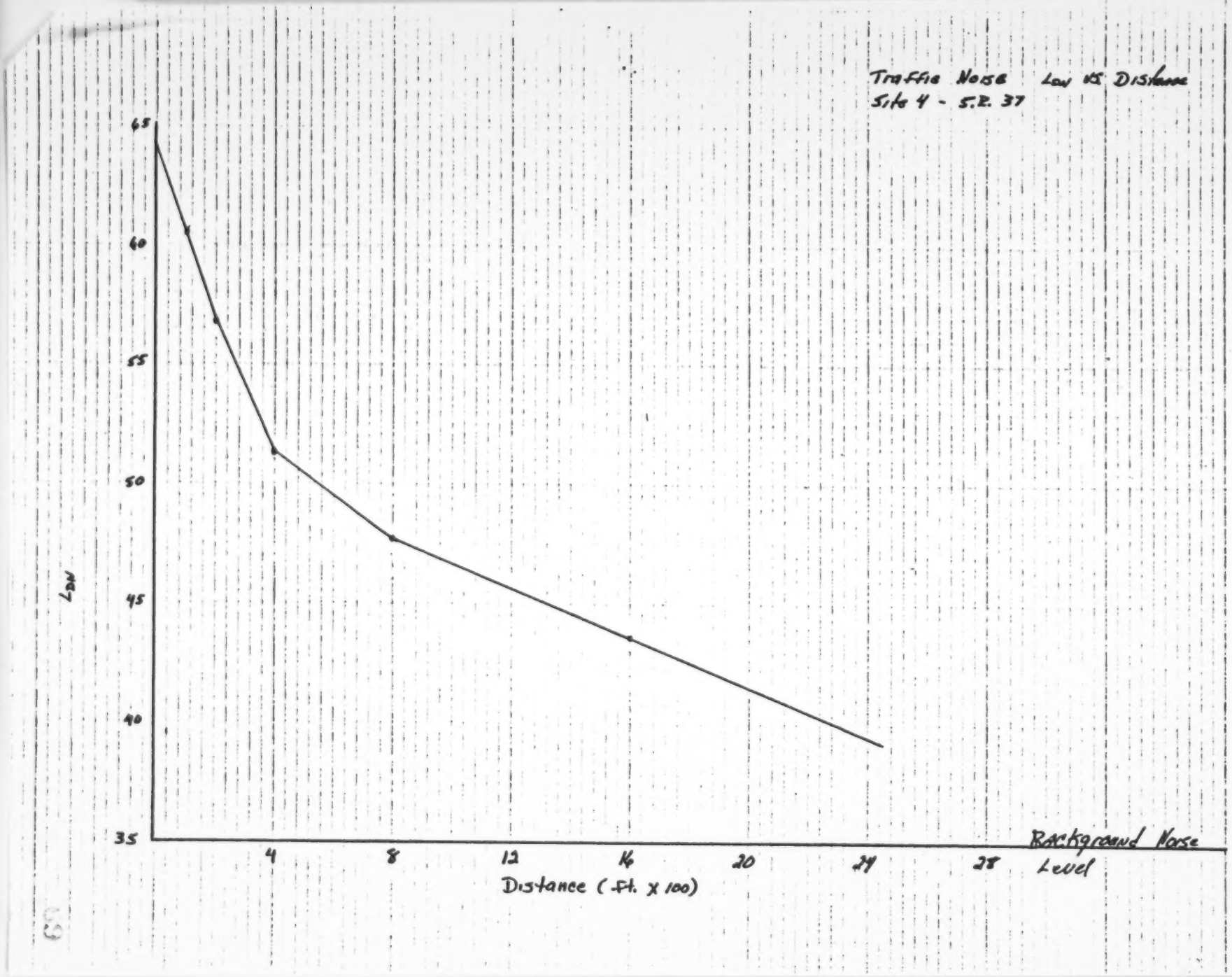
APPENDIX B-4


Traffic Noise L_{DN} vs. Distance
Site 2 - S.R. 62 (East of S.R. 37)
65
60
55
50
45
40
35
L_{DN}
4
8
12
16
20
24
28
Background Noise Level
Distance (Ft. X 100)

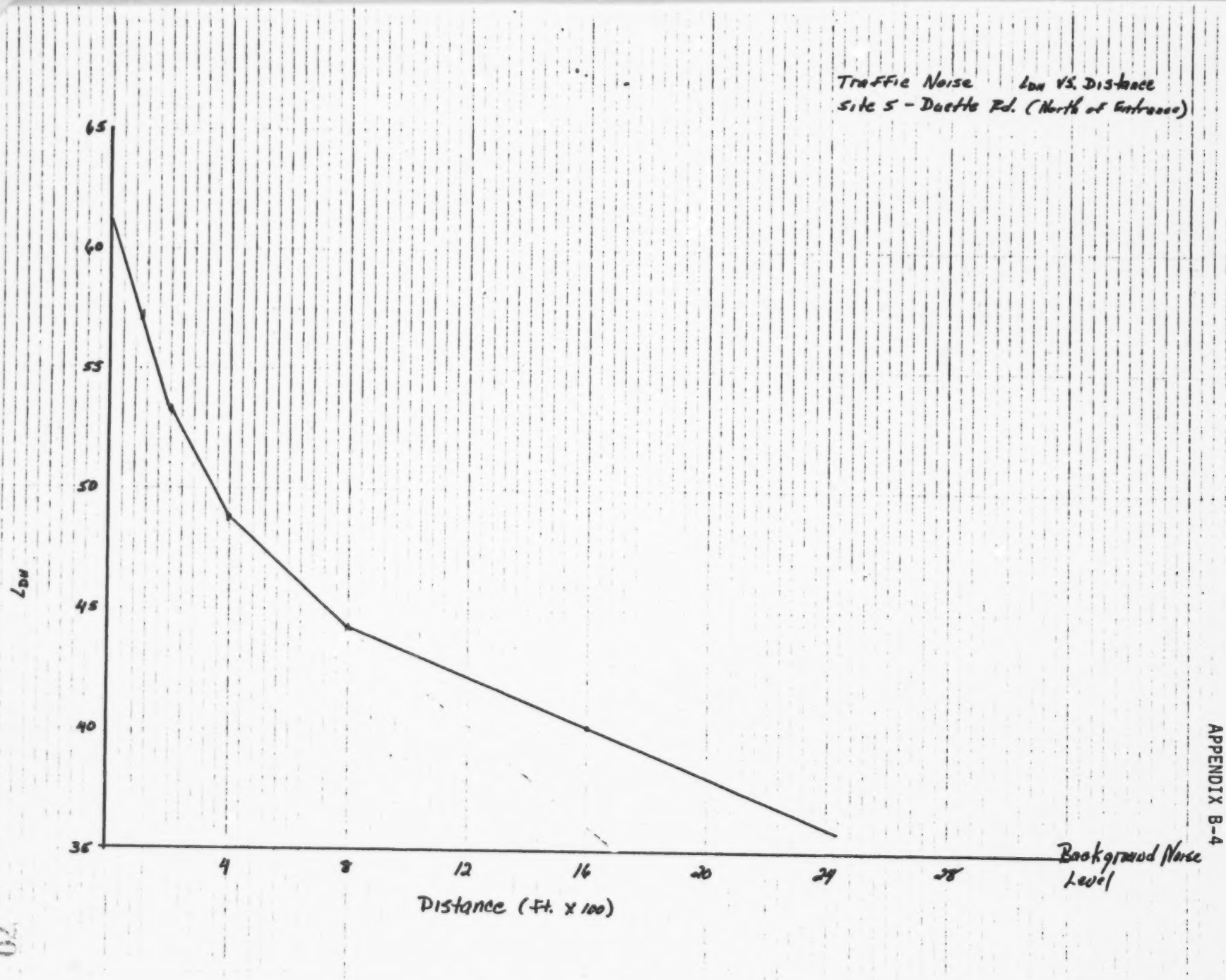
APPENDIX B-4


Traffic Noise Low Vs. Distance
Site 3 - S.T. 39
65
60
55
50
45
40
35
Low
4
8
12
16
20
24
28
Distance (Ft. X 100)
Background Noise Level

APPENDIX B-4

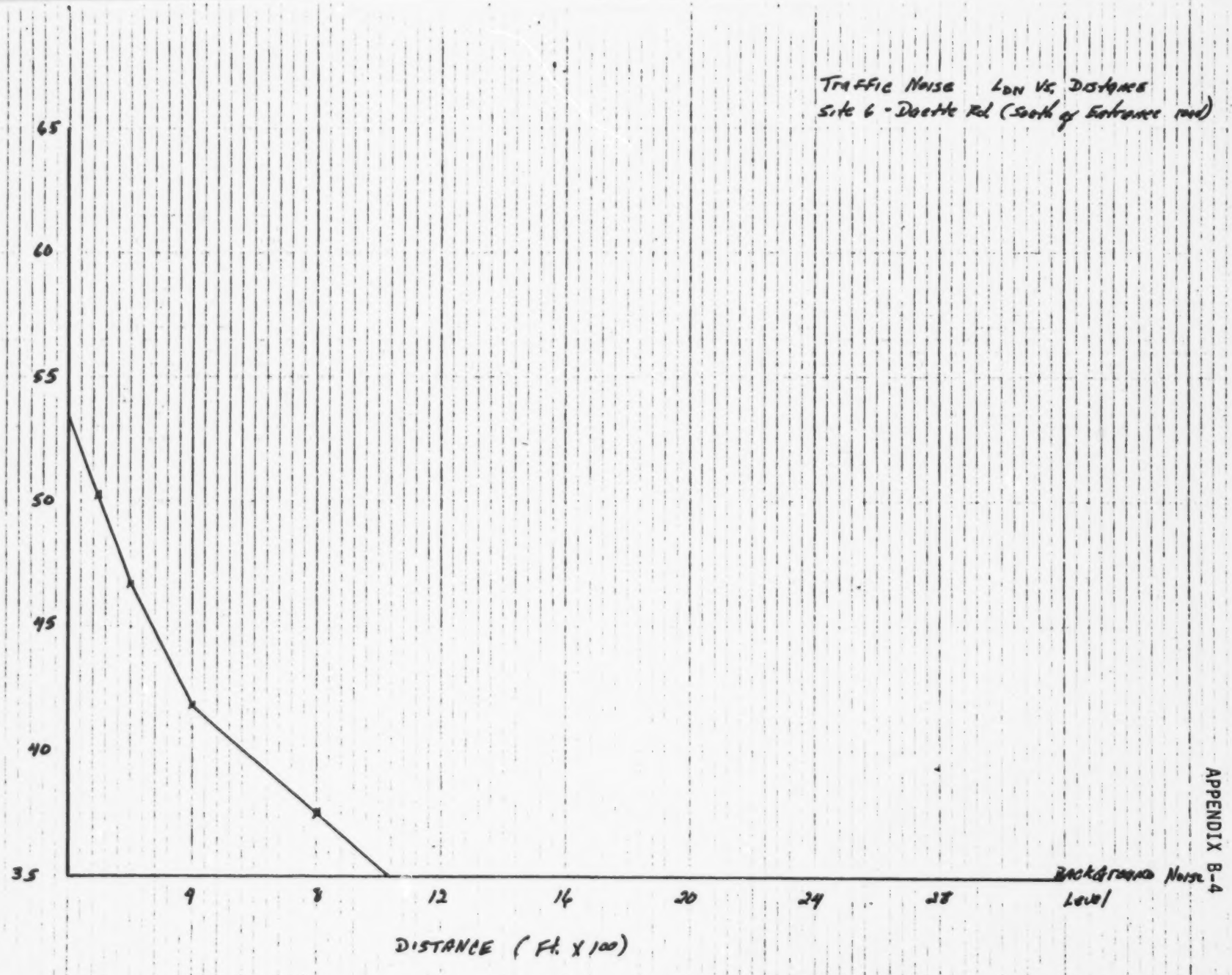

Traffic Noise Low vs Distance
Site 4 - S.R. 37
65
60
55
50
45
40
35
Leq
4
8
12
16
20
24
28
Distance (ft. x 100)
Background Noise Level

APPENDIX B-4

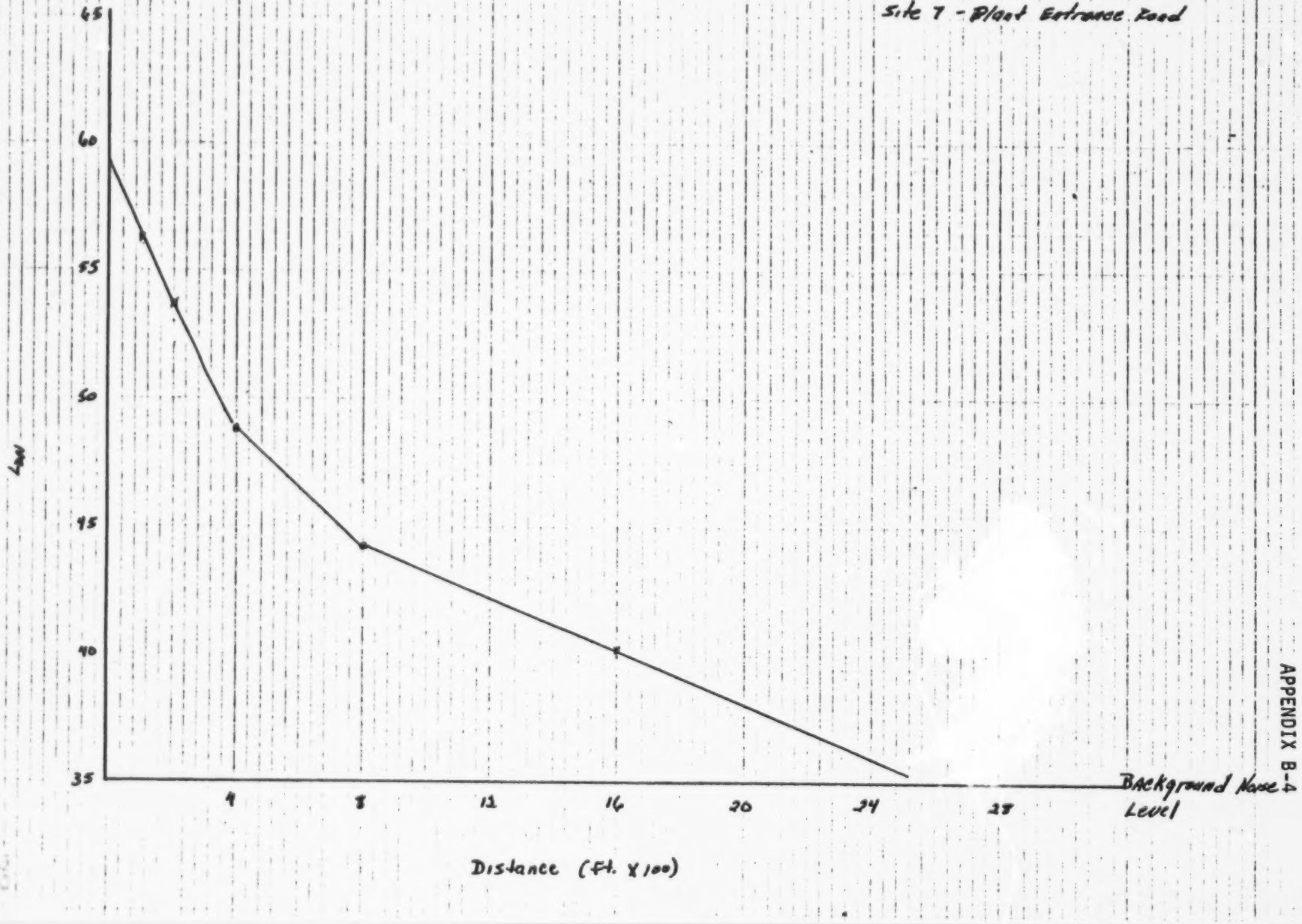

Traffic Noise L_{DN} vs. Distance
Site 5 - Dactle Rd. (North of Entrance)
65
60
55
50
45
40
35
L_{DN}
4
8
12
16
20
24
28
Background Noise Level
Distance (Ft. x 100)

APPENDIX B-4

Traffic Noise L_{DN} Vs. Distance
Site 6 - Beattie Rd. (South of Entrance road)



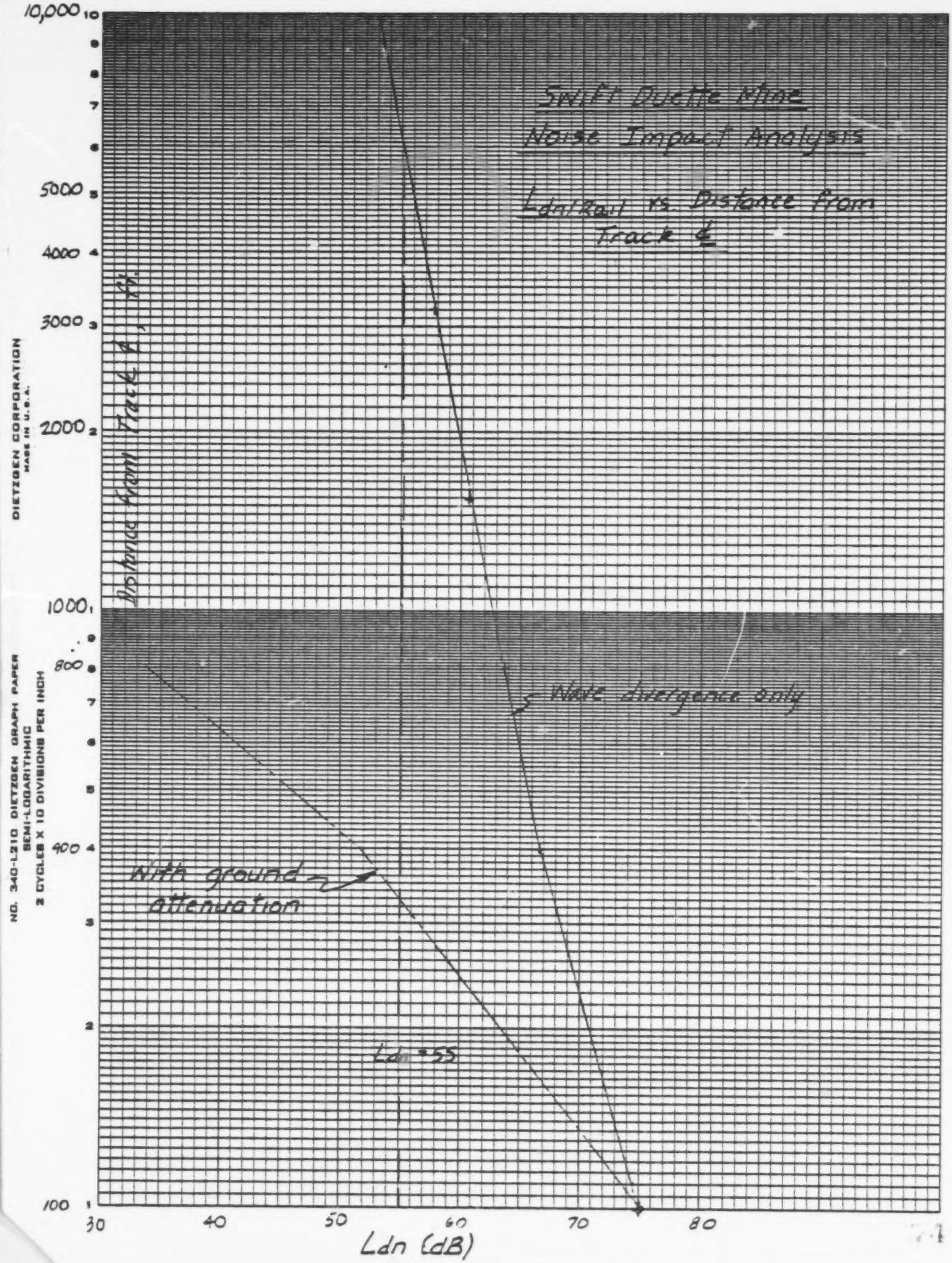
APPENDIX B-4


Traffic Noise Leq Vs. Distance
Site 7 - Plant Entrance Road
65
60
55
50
45
40
35
Leq
4
8
12
16
20
24
28
Background Noise Level
Distance (Ft. X 100)

APPENDIX B-4

APPENDIX C

RAILROAD L_{DN} VERSUS DISTANCE FROM TRACK


Swift Ductile Mine
Noise Impact Analysis
Ldn/Rail vs. Distance from Track ℄
Ashbrook Haml Track ℄ , 1991
Note divergence only
With ground attenuation
Ldn=55
Ldn (dB)
10,000
5000
4000
3000
2000
1000
800
400
100
30
40
50
60
70
80
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